BILL OF MATERIALS
for
BULL BARN

Serial No. 945-6.
(For Northern Conditions)

Concrete

Mixtures: Foundations (extending 2'-0" below grade) and 5 inch base of floor; 1 part Portland cement, 3 parts sand, and 5 parts gravel or broken stone; 1 inch top of floor to be, 1 part Portland cement, 2 1/2 parts sand.

Quantities. Wall: 20 sacks cement; 2.25 cu. yd. sand; 3.75 cu. yd. gravel.
Floor, 5" base; 14 sacks cement; 1.56 cu.yd. sand; 2.58 cu.yd. gravel
" 1" top; 7 sacks cement; 0.53 cu. yd. sand.

Lumber

2 - 2" x 4" x 16' sills
1 - 2" x 4" x 14' "
5 - 2" x 4" x 12' "
28 - 2" x 4" x 14' studs
3 - 2" x 4" x 10' horiz.
10 - 2" x 4" x 12' plates
10 - 2" x 4" x 12' joists
10 - 2" x 4" x 16' rafters
2 - 2" x 6" x 16' " (S 4 S)
4 - 7/8" x 4" x 12' verge
2 - 1 1/8" x 7 1/2" x 16' frieze
3 - 1 1/8" x 4" x 12' frieze
2 - 1" x 6" x 10' ridge
2 - 1" x 6" x 16' braces
4 - 1 1/8" x 4 1/2" x 16' corner boards.
550 ft. B.M. 6" drop siding
880 ft. B.M. 8" sheathing
650 ft. B.M. 6" T & G ceiling
500 sq. ft. building paper
350 sq. ft. prepared roofing

Hardware

1 swinging door lock set.
1 pair 3 1/2" x 3 1/2" loose pin butt hinges for door
4 pair 3" x 3" loose pin butt hinges for windows.
11 - 8 ft. sliding door track with bolts, brackets, and hangers.
2 guide rollers
2 awning pulleys for 5/16" diameter rope.
14 screw eyes
2 screw pulleys for 5/16" diameter rope.
36 ft. 5/16" diameter rope.
4 sash catches or hooks.
14 - 5/8" x 16" anchor bolts
1 - bull pen panel)
1 - bull pen gate.)
1 - bull pen manger with stanchion.)

Windows

4 - 6 light, 9" x 12" glass, sash, frames and trim.
32 lin. ft. 3/4" quarter round
48 lin. ft. 1/2" x 1 5/8" stop
1 - 8 light sash, 8" x 10" glass

Sliding Door

20 ft. B.M. 1" x 4" T & G flooring
3 - 7/8" x 7 1/2" x 16'
1 - 7/8" x 7 1/2" x 10'
1 - 7/8" x 9 1/2" x 8'
2 - 7/8" x 6" x 10'

Frame for Sliding Door

1 - 7/8" x 7 1/2" x 10' track plank
1 - 7/8" x 4" x 16' casing
2 - 1 1/8" x 4" x 12' "
1 - 1 1/8" x 4" x 8' "
2 - 7/8" x 5 1/2" x 12' jamb
1 - 7/8" x 5 1/2" x 8' "

Single Door

2 - 7/8" x 4 5/8" x 12' jamb
3 - 1 1/8" x 4" x 12' casing
2 - 1/2" x 2" x 12' stop
1 stock door 3' x 7' x 1 3/8"

Nails.

38# 8d 15# 20d 12# 10d

Drains

1 - manger drain with plug
1 - 8" bell trap
4" C.I. soil pipe from bell trap to 3'-0" outside of wall with fittings as required.
2" galv. iron pipe from manger drain to 4" drain.
1" galv. iron pipe with fittings as required.
1" - 1" stop and waste.

BILL OF MATERIALS FOR SHEEP BARN

4 Serial Nos. B-567, 568 and 569

CONCRETE MATERIALS:

Foundations, piers, etc. (Mixture 1:3:5)
Cement - 110 sacks. Sand - 12.5 cu. yds. Screened gravel - 20.5 cu. yds. If bank run gravel isuused, mixture 1:6, substitute 24 cu. yds. bank run gravel for quantities of sand and gravel given above.

Floor - $3\frac{1}{2}$" base - mixture 1:3:5
$\frac{1}{2}$" top - mixture $1:2\frac{1}{2}$
Cement - 62 sacks. Sand - 6.6 cu. yds. Screened gravel 8.5 cu. yds. If bank run gravel is used in base, mixture 1:6, substitute 1.5 cu. yds. sand and 10 cu. yds. bank run gravel for quantities given above.

BRICKWORK OF CHIMNEY:

2500 common brick
1.6 cu. yds. sand
Flashings as may be needed

16 sacks Portland cement
1 barrel lime

MAIN BARN:

Framing Lumber:

Sills:
6 - 2"x 6"x 14'
4 - 2"x 6"x 16'
Bolts - 30 - $\frac{1}{2}$"x 12"

Studs, Bridging, etc.:
North End
40 - 2"x 6"x 16'
4 - 2"x 8"x 16'
1 - 2"x 8"x 18'
South End
44 - 2"x 6"x 16'
4 - 2"x 6"x 18'
Sides
72 - 2"x 6"x 16'

Lintels over Pen Doors:
8 - 2"x 10"x 10'

Corner Braces:
4 - 1"x 8"x 12'

Plates:
Ends
12 - 2"x 8"x 12'
Sides
16 - 2"x 8"x 14'

Posts:
9 - 4"x 4"x 14'
1 - 4"x 4"x 16'
Straps - 14 - $\frac{1}{2}$"x $1\frac{1}{2}$"x 30" W. steel
Bolts - 28 - $\frac{1}{2}$"x 5"

Bolsters:
1 - 4"x 6"x 18' oak

Girders:
Main
24 - 2"x 8"x 14'
At Grain Bins
3 - 2"x 8"x 14'

MAIN BARN:

Framing Lumber: (continued)

Joists:
80 - 2"x 12"x 16'

Bridging:
20 - 1"x 3"x 14'

Ribbons:
8 - 2"x 6"x 14'

Wind Braces:
South End
4 - 2"x 8"x 12'
Bolts - 8 - 5/8"x 8" or 10"
Sides
10 - 2"x 8"x 16'
Bolts - 10 - 5/8"x 12" or 14"

Knee Braces:
12 - 2"x 6"x 14'

Truss Pieces:
6 - 2"x 10"x 14' rafters
2 - 2"x 10"x 12' ties
6 - 2"x 8"x 12' trafters
12 - 2"x 6"x 10' lower chord
12 - 2"x 6"x 16' " "
6 - 2"x 6"x 16' curb ties
2 - 2"x 4"x 12' top ties
4 - 2"x 4"x 16' knee braces
Bolts - 24 - 5/8"x 10" or 12"

Note: In Wind Braces and Trusses use shorter bolts with surfaced lumber - longer bolts with rough lumber.

Purlins:
12 - 2"x 10"x 14'
2 - 2"x 10"x 12'
2 - 2"x 10"x 16'

Ridge:
6 - 2"x 10"x 14'
2 - 2"x 10"x 20'

Rafters:
60 - 2"x 6"x 14' lower reach
60 - 2"x 6"x 12' upper reach
2 - 2"x 6"x 14' peak at north end
12 - 2"x 6"x 16' lookouts

Shingle Lath:
2400 bd. ft. 1"x 4"

Shingles:
30 M.

Floor Above Grain Bins:
13 - 2"x 8"x 14'
400 bd. ft. 1"x 6" D&M flooring

Siding:
Sidi4000 bd. ft. drop siding

Mow Floor:
2400 bd. ft. 1"x 6" D&M flooring

Floor of Shepherd's Room:
300 bd. ft. 1"x 6" D&M flooring

Wall of Shepherd's Room:
Sole pieces - 2 - 2"x 4"x 14'
Studs - 8 - 2"x 4"x 16'
Ceiling - 840 bd. ft. 5/8"x 4" M&B ceiling

Stock Doors:
1 - 2'8"x 6'8"x 1-3/8"
2 - 2'0"x 6'8"x 1-3/8"
3 pr. 3" loose pin butts
3 sets inside locks

Stairs:
Carriage - 1 - 2"x 6"x 14'
" - 1 - 2"x 10"x 14'
Treads - 3 - 2"x 10"x 14'

MAIN BARN:

Walls of Grain Bins, Etc.:
Sole pieces - 5 - 2"x 6"x 14'
Studs - 14 - 2"x 6"x 16'
" - 2 - 2"x 4"x 10'
Plates - 9 - 2"x 6"x 14'
Lining - 750 bd. ft. 1"x 6" D&M flooring
Spouts - 6 - 1"x 8"x 10'
" - 2 - 1"x 12"x 10'

Alley Doors:
55 bd. ft. 1"x 4" D&M flooring
6 - 1"x 6"x 14' battens
1 - 1"x 8"x 8' trim
16' bird-proof track
2 pair hangers for same
1 - 6-light 8"x 10" sash
1 pair 2½" G. I. butts with brass pins
Latches as preferred

Four Doors to Sheep Pens:
200 bd. ft. 1"x 4" D&M flooring
28 - 1"x 8"x 16' battens
3 - 1"x 6"x 16' water tables
4 - 1"x 8"x 16' trim
6 - 1"x 4"x 16' "
4 - 1"x 4½"x 14' "
64' bird-proof track
8 pair hangers for same
8 - 6-light 10"x 12" sash
8 pair 2½" G. I. butts with brass pins
Latches as preferred

Ventilators, Double Thickness of Boards, Paper Between:
900 bd. ft. 1"x 6" D&M flooring
4 squares paper
1 - 24" galvanized iron ventilator

Hay Chutes:
6 - 2"x 4"x 20'
20 - 1"x 6"x 16'

Hay Door:
180 bd. ft. 1"x 4" D&M flooring
5 - 1"x 8"x 18' battens
18' bird-proof track
2 pair hangers for same
Counter balances, pulleys, cables, etc.

Mow Doors:
100 bd. ft. 1"x 4" D&M flooring
3 - 1"x 6"x 12' battens
3 pair 8" strap hinges
2 " 6" " "
Latches as preferred

Tackle Beams:
1 - 4"x 4"x 8'
1 - 4"x 6"x 8'

Windows, complete with Stock Frames and Trim:
2 casement windows - 9-light 6"x 9"
1 double window (double hung) - 12-light 8"x 10"
2 " " " " - 12-light 10"x 12"
2 single sash - 6-light 10"x 18"
2 double sash - 6-light 10"x 18"
8 pair 3" G. I. butts with brass pins.

Trim (Exterior):
4 - 1"x 4½"x 18' (north corners)
4 - 1"x 4½"x 10' (south corners)
9 - 1"x 4½"x 16' (around doors)
Gutter - 116' of 5" G. I. gutter
Downspout - 32' of 3" downspouts, with bends, etc.

SHED:

Framing Lumber:

Sills:
2 - 2"x 4"x 16'
4 - 2"x 4"x 14'
Bolts - 18 - ½"x 12"

Studs, Etc.:
South End
9 - 2"x 4"x 10'
11 - 2"x 4"x 12'
Sides
22 - 2"x 4"x 14'

Plates:
6 - 2"x 4"x 14'

Knee Braces:
12 - 2"x 4"x 12'

Corner Braces:
2 - 1"x 8"x 12'

Lintels Over Doors:
4 - 2"x 10"x 10'

Posts:
12 - 4"x 4"x 12'
Straps - 8 - ½"x 1½"x 30" W. steel
Bolts - 16 - ½"x 5"

Trusses:
10 - 2"x 6"x 16'
4 - 2"x 8"x 18'
2 - 2"x 10"x 10'
Bolts - 32 - ½"x 8", or 10"

Purlins:
12 - 2"x 4"x 14'
12 - 2"x 6"x 14'

Ridge:
2 - 1"x 6"x 14'
1 - 1"x 6"x 16'

Rafters:
54 - 2"x 4"x 20'

Ties:
7 - 2"x 4"x 16'

Siding:
840 bd. ft. drop siding

Roof Sheathing:
1900 bd. ft. SIS

Prepared Roofing:
18 squares

Four Doors to Sheep Pens:
Same as in Main Barn.

Windows, Complete with Stock Frames and Trim
2 single sash 6-light 10"x 18"
2 double sash 6-light 10"x 18"
6 paid 3" G. I. butts with brass pins

South Door:
35 bd. ft. 1"x 4" D&M flooring
1 - 1"x 6"x 12' batten
1 - 1"x 6"x 14' "
8' bird-proof track
1 pair hangers for same

Trim:
2 - 1"x 4½"x 18' (corners)
1 - 1"x 4½"x 16' (south door)
Gutter - 86' of 5" G. I. gutter
Downspout - 14' of 3" downspout with bends, etc.

Ventilators:
2 - 18" G. I. ventilators

Note: This does not include material for pens, racks, etc.

~~BILL OF MATERIALS FOR HOG HOUSE.~~

Serial No. B-683.

Concrete Work:

The table below gives the quantities required for foundations as shown on the drawings and must be changed if actual depths are to be different; foundations should be carried down below frost line. Three different types of pen floors are shown on the drawings; quantities for six pens of each type are given. Concrete floors consist of 3 1/2" base and 1/2" top.

Mixtures: For foundations, piers and base of floors, 1 part cement; 3 parts sand; 5 parts screened gravel or broken stone, OR 1 part cement; 6 parts bank run gravel. For top of floor, 1 part cement, 2 1/2 parts sand. For troughs 1 part cement; 2 parts sand; 3 parts screened gravel or broken stone.

	Foundations	Alley	Troughs	Floor	Alternate Floor #1.	Alternate Floor #2.
Cement sacks	20	7	5	13	5	4
Sand	2.5 cu.yds.	1.25 cu.yd	10 cu.ft	1.5 cu.yds.	14 cu.ft.	14 cu.ft.
Stone	3.6 " "	.75 " "	14 " "	2.25 " "	24 " "	20 " "
Alternate Mixture.						
Cement sacks	20	7	5	13	5	4
Gravel	4.6 cu.yds.	1.5 cu.yd.	20 cu.ft	3 cu.yds.	1.25 cu.yd	1 cu.yd.
Cement Top Finish.						
Cement sacks		3		3	2	2
Sand		6 cu.ft.		10 cu. ft.	4 cu. ft.	3 cu. ft.
Additional Materials in Troughs and Floors.						
			6- 1/4" reinforcing rods 16' long	9 1x8 18' 3 2x4 16'	9 2x4 12' 27 2x8 12' 2 cu.yds. gravel for fill.	71' - 48" hog wire 3/4 bbl. crude oil.

LUMBER, ETC.

Sills.

2 - 2"x4" - 14'
3 - 2"x4" - 12'
2 - 2"x4" - 10'

Studs.

18 - 2"x4" - 14'
7 - 2"x4" - 10'

Drop Siding.

525 B. M.

Ventilators.

1 - 2"x12" - 16' S.4S.
1 - 1"x3" - 16' S.4S.
2 - 1"x10" - 10' S.1S

Plates
4 - 2" x 4" - 12'
8 - 2" x 4" - 14'

Posts
2 - 4" x 4" - 8'
5 - 2" x 4" - 16'

Purlin
2 - 2" x 6" - 14'
1 - 2" x 6" - 12'
2 - 2" x 4" - 14'
1 - 2" x 4" - 12'

Rafters
19 - 2" x 4" - 12'
10 - 2" x 4" - 10'
2 - 2" x 4" - 14' braces

Sheathing
1100 ft. B.M. 1" x 6"

Skylight
6 -3 lt. sash 12" x 16" glass
2 - 1" x 2" - 16'
2 - 1" x 2" - 14'
2 - 1" x 2" - 12'

Air Intakes
1 - 1" x 4" - 12'

Upper Doors
60 ft. B.M. 1" x 4" D &M flooring
2 - 1" x 6" - 14'

Pen Doors
45 ft. B.M. 1" x 4" D&M flooring
2 - 1" x 6" - 12'
3 - 1" x 4" - 14' S.4 S.

Alley Gates
6 - 1" x 4" - 16'

Barge Boards
4 - 2" x 6" - 14'
2 - 2" x 6" - 12'
2 - 2" x 4" - 12'

Fascia
3 - 1" x 4" - 12'
2 - 1" x 4" - 14'

Corner Boards
2 - 1" x 3 1/2" - 10'
2 - 1" x 4 1/2" - 10'

Entrance Doors
50 ft. B.M. 1"x4" D&M flooring
2 - 1" x 6" - 10' battens
2 - 2" x 2" - 14' S.4 S.
1 - 2" x 2" - 6' S.4 S.
2 - 1" x 2" - 14' S.4 S.
1 - 1" x 2" - 6' S.4 S.
1 - 1" x 4 1/2" 14' trim S.4 S.

Wire Partitions
5 - 1" x 4" - 16'
5 - 1" x 4" - 12'
5 - 1" x 4" - 10'
5 - 1" x10" - 16'

Wood Partitions. (Alternate)
5 - 1" x 10" - 16'
5 - 1" x 8" - 16'
5 - 1" x 4" - 12'

Swing Gates at Troughs
2 - 2" x 4" - 12'
12 - 1" x 4" - 12'

Fenders (Wall)
1 - 2" x 4" x 16'
1 - 2" x 4" x 12'

Fenders, (Partition)
2 - 2" x 4" x 10'

Roofing Material

6 squares prepared roofing.

HARDWARE

3 pairs 6" strap hinges (entrance doors)
2 latches " "
6 pairs 3" butt hinges. (skylights)
6 - 2 ft. sash adjusters "
6 pairs 2" butt hinges. (Intakes)
6 - 3" barrel bolts "
6 pairs 4" strap hinges (Upper doors)
6 door pulls " "
6 pairs 6" strap hinges (Pen doors)
6 - 6" chain bolts " "
12 - 2" pulleys " "
6 - 4" cleats " "
3 - 1/4" x 1 1/4" x 20" wrought steel straps (pen doors)
6 - 1/4" x 2 1/2" lag screws
90 ft. 1/4" manila rope
6 pairs 3" T hinges (Alley gates)
6 - 3" barrel bolts " "
20 - 4" barrel bolts (Partitions between pens)
40 ft. 32" wire fencing (Wire partition) (Alternate with wood partition)
24 - 1/4" x 3" bolts, nuts and washers
30 - 1/2" x 10" " " " " (Sills)
11 - 1/2" x 6" wrought steel dowels (Posts)
24 - 1/4" x 2" staples (Swing gates at troughs)
22 ft. 24" wire fencing " " " "
12 - 3" wire staples. (Swing gates at troughs)
6 - 1/2" x 3' wrought steel rods. (Swing gates at troughs)
12 ft. light chain. (Swing gates at troughs)
39 ft. 4" gutter (Galv. iron - 26 gage)
14 ft. 3" down spout (Galv. iron - 26 gage)
3 gallons paint
35 lbs. 6d nails. 2 lbs. 16d nails.
30 " 10d nails. 20 lbs. 20d nails.

Hardware for Fenders.

At wall. Folding
8 pairs 8" extra heavy strap hinges.
16 - 3/8" x 13" hooks with cotter pins and 3" bolts.
32 - 3/8" screw eyes

At wall, Fixed (Alternate)
8 - pairs 3/16" x 1 1/2" x 12" wrought steel straps.
8 " 3/16" x 1 1/2" x 16" " " "
32 - 1/4" x 2" lag screws
32 - 1/4" x 3" bolts, nuts and washers.

On partitions, Folding.
4 pairs 3/8" x 8" hooks with cotter pins and 3" bolts.
16 - 3/8" screw eyes
8 8" extra heavy strap hinges

On partitions. Fixed, (Alternate)
4 - 3/16" x 1 1/2" x 16" wrought steel straps
4 - 3/16" x 1 1/2" x 12" " " "
16 - 1/4" x 3" bolts, nuts and washers.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ENGINEERING
DIVISION OF PLANS AND SERVICE

* * * * * *

LIST OF PLANS PREPARED FOR FREE DISTRIBUTION
(Unless otherwise noted all barns are frame)

Serial Numbers

DAIRY BARNS

495 DAIRY BARN 18 by 30 ft. Bill of Materials
2 stories; 4 cow stalls; calf pen for 3 calves; storage on ground floor for about 2 T hay; stair to mow; mow capacity 5 T; gable roof, concrete foundations.

590 DAIRY BARN 36 by 63 ft. Bill of Materials
1 story; 30 cows facing 8 ft. central feed alley; post and girder construction with boarding on inside and no exterior siding; gable roof; concrete pier foundation with curtain wall and concrete floor. Adapted to temperate climates.

687 DAIRY BARN 36 by 70 ft.
2 stories; 30 cows facing 8 ft. central feed alley; feed room; box stall mow capacity 75 T.; grain room and 2 bins, 48 bu. each in mow; gambrel roof; concrete foundations and floor. Adapted to cold climates.

755 DAIRY BARN 36 by 71 ft. Bill of Materials
2 stories; 20 cows facing 8 ft. center driveway; calf pen; box stall; feed room; mow capacity 75 T; grain room with 3 bins, 36 bu. each on mow floor; gambrel roof with trussed rafters; concrete foundation and floor; adapted to cold climates

774 DAIRY BARN Bill of Materials
Same as Design No. 755 but of bent construction with roof trusses spaced 14 ft. center to center.

793 DAIRY BARN 34 by 45 ft,
1 story; 20 cows facing out; 6 ft. center driveway; hollow tile stuccoed walls; gable roof. Designed for use with feed barn.

839 DAIRY BARN Bill of Materials
Typical 1 story design, 34 ft. wide, adapted to 8 different floor plans; concrete foundations and floors with 8 ft. center drive or 6 ft. feed alley; gable roof. Designed for use with feed barn. Drawings provide for barns of following sizes:

34'x45' - 20 cows	facing	out;	34'x84' - 40 cows	facing	out.
34'x45' - 20 "	"	in;	34'x84' - 40 "	"	in.
34'x62' - 30 cows	"	out;	34'x105'- 52 "	"	out.
34'x62' - 30 "	"	in;	34'x105'- 52 "	"	in.

1079 DAIRY BARN 16 by 20 ft. Bill of Materials.
1 story; 1 cow in open stall; hay storage for 3 T; 6 bu. grain bin. Adapted to temperate climates.

Serial Numbers

DAIRY BARNS (Cont'd)

1155-6 DAIRY BARN 34 by 70 ft. Bill of Materials.
1 story; 20 cows in one end; grain room and hay storage space in other end; hay storage capacity 25 tons loose hay; gable roof, concrete foundations, sides covered with boards and battens.

HORSE BARNS

453 HORSE BARN 30 ft. by 32 ft. Bill of Materials.
1 1/2 stories; 7 single and 1 box stalls; feed room; harness room; center drive; mow capacity 14 tons; gable roof; concrete foundations, ventilation and light through slatted openings; no frames or sash. Adapted to warm climates only.

631-2 HORSE BARN 34 ft. by 42 ft. Bill of Materials.
2 stories; 3 single, 4 double, 1 box stall; harness room; grain bin 450 bu.; corn crib 500 bu. ear corn; mow capacity 50 tons; 4 ft. central feed alley; gambrel roof; concrete foundations and wall to window sills.
Alternate ground floor plan provides for:-
2 single, 3 double and 1 box stall; 2 grain bins 800 bu. each; space for buggies; 4 ft. central feed alley.

1204-5-6 HORSE BARN 36 ft. 76 or 64 ft. Bill of Materials.
2 stories; 20 single stalls face out; 2 box stalls; 2 feed bins about 500 bu. each; tool and harness room; stair to mow; 10 ft. central driveway; mow capacity 100 tons loose hay; gambrel roof; concrete foundations. Ventilation through slatted louvers in sides. (No windows at rear of stalls)
Two alternate floor plans:-
First has same accommodations as principal floor plan but arrangement of stalls is different. Second provides for 20 single stalls and 1 box stall; tool and harness room; stair to mow; mow capacity 85 tons loose hay. 36 ft. by 64 ft. Adapted to temperate climates.

GENERAL BARNS

454-5-6 GENERAL BARN 34 ft. by 96 ft.
7-8 2 stories; horse stable with 8 single stalls; bull pen; 2 cow pens; 1 pen for 5 calves; harness cabinet and feed room; Cow stable with 20 stanchions facing 6 ft. central feed alley; mow with capacity of 150 tons and 2 grain bins 70 bu. each. Gambrel roof; concrete foundations. 13 ft. by 60 ft. open feeding shed attached. Manure pit and spreader shelter under shed roof.

Serial Numbers

GENERAL BARNS

612-13 GENERAL BARN 56 by 64 ft. Bill of Materials

4 double horse stalls; 1 box stall; 5 cow stanchions facing in; pens for 65 sheep; 4 grain bins 300 bu. each; crib for 300 bu. ear corn; mow extends from ground to ridge with 58 tons capacity; gambrel roof 26 ft. span with 15 ft. shed on each side. Concrete foundations; board and batten exterior.

621-2-3-4 GENERAL BARN 36 by 91 ft. Bill of Materials

2 stories; basement provides for 3 single and 1 double horse stalls; 2 box stalls; pen for 7 calves; 27 cow stanchions; 8 ft. center driveway; water trough; harness room; horse stair; feed room.

Concrete bridge to 2nd floor. Second floor contains grain storage space and 3 grain bins 136 bu. each; drive and vehicle storage space; mow with 70 tons capacity. Gable roof; concrete floor and basement walls to window sills. Adapted to cold climates.

723-4 GENERAL BARN 32 ft, by 36 ft. Bill of Materials

2 stories; horse stable with 4 single and 1 box stalls; cow stable with 4 stanchions facing in; 2 grain bins, 400 bu.each; mow capacity 25 tons; gambrel roof; concrete foundations and floor.

845-6-7-8-9 GENERAL BARN 36 by 56 ft.

2 stories; 6 single horse stalls; 2 box stalls; pen for 10 calves; harness room; feed room; water trough; mow with 70 tons capacity; grain room on mow floor with 3, 30-bu. bins. Hollow tile construction; gable ends framed & stuccoed; gambrel roof.

918-19-20 GENERAL BARN 60 by 80 ft.

4 double and 1 single horse stalls; 2 box stalls; calf pen; cow stable with 6 stanchions; shed for 40 head loose cattle; mow from ground to ridge with 100 tons capacity; storage room for 1000 bu. ear corn; feed storage & bins. Gambrel roof; concrete foundations.

1267-8-9-70 GENERAL BARN 36 by 60 ft. Bill of Materials

2 stories; 16 cow stalls facing central feed alley; 3 box stalls across one end of barn; feed room; stair to mow; mow capacity 80 tons loose hay; gambrel roof; concrete foundations. Ventilation flues suggested. Alternate plan, provides one less box stall & central feed alley extends full length of barn. Adapted to cold climates.

1330-1-2 GENERAL BARN 36 by 56 ft. Bill of Materials

2 stories; 4 single & 4 double horse stalls; 2 box stalls; feed & harness rooms; 2 corn cribs; 6 ft. cleaning alley each side & 6 ft. central feed alley. Lean-to 20 by 36 ft. attached for 10-16 head loose stock. Mow capacity 100 tons loose hay. Gambrel roof; concrete foundations. Ventilation system indicated.

Serial Numbers

SHEEP BARNS

567 SHEEP BARN — Bill of Materials
165 sheep; buck pen; shepherd's room; scales platform; main building 36 by 56 ft.; 2 stories with mow of 55 tons capacity; feed room with 3 bins on mow floor; gambrel roof; 1 story extension 36 by 42 ft.; gable roof; concrete foundations.

1148 SHEEP BARN — 16 by 48 ft. — Bill of Materials
2 stories; 50 to 60 loose sheep; feed rack in center; mow capacity 14 tons loose hay. Self supporting frame on concrete piers; gable roof. Sides covered with boards & battens.

CATTLE BARNS

1175 CATTLE BARN (closed type) — 36 by 72 ft. — Bill of Materials
2 stories; 48 to 68 head loose cattle; concrete paved central feed alley with feed troughs and hay racks on each side; mow capacity 100 tons loose hay; gambrel roof; concrete foundations. Adapted to cold climates. (Feed room 20 by 20 ft. shown connected to two 14 ft. diameter silos).

1185 CATTLE BARN (open type) — 36 by 72 ft. — Bill of Materials
2 stories; 48 to 68 head loose cattle; concrete paved central feed alley with feed troughs and hay racks on each side; mow capacity 100 tons loose hay. Gambrel roof; concrete piers; ground floor open; mow sides covered with boards & battens. Adapted to temperate climates. (Feed room 20 by 20 ft. shown connected to two 14 ft. diameter silos).

SPECIAL PEN BARNS

596 BULL AND CALF BARN — 36 by 56 ft. — Bill of Materials
1 1/2 stories; pens for 30 calves; 4 maternity pens; 1 bull pen; 8 ft. central driveway; mow for 20 T of hay; gambrel roof; post and girder construction covered with boards and battens; concrete pier foundation with curtain wall; earth floor. Adapted to temperate climates.

929 CALF BARN — Bill of Materials
Center building 2 stories, 24 by 32 ft.; bedding, feed and wash rooms; scale platform; mow capacity 15 T; two 1 story wings 22 by 52 ft. accommodating 55 calves total; gable roof.

SPECIAL PEN BARNS (Cont'd)

Serial Numbers

932-3-4-5 FEEDING BARN 36 ft. by 98 ft.
2 stories; 10 box stalls; 1 bull pen; calf pen for 15 head; young stock pen for 7 head; feed room; closet; mow capacity 150 tons; feed room with 4 bins on mow floor. Gambrel roof; concrete foundations.

936-7 BULL BARN 12 ft. by 18 ft. Bill of Materials.
1 story; bull pen; feed alley; 2 grain bins, 12 bu. each; gable roof; concrete foundation and floor; iron stanchion and rail. Adapted to temperate climates.

945-6 BULL BARN
Same as Design No. 936-7 but construction adapted to cold climates.

1140-41 BULL BARN 12 ft. by 18 ft. Bill of Materials.
Similar to Design No. 936-7; concrete pier foundation; dirt floor; board and batten exterior; wood stanchion and rail. Adapted to temperate climates.

CATTLE SHEDS

761-2 FEEDING SHED 20 ft. by 60 ft. Bill of Materials.
30 head young stock; 1 bull; 3 ft. feed alley; open front.

763 CATTLE SHED 20 by 68 ft. with 20 by 24 ft. ell Bill of Materials.
50 head loose cattle; ell shaped open front; gable roof; concrete foundations.

SHEEP SHEDS

565 SHEEP SHED 16 ft. by 24 ft. Bill of Materials.
25 sheep; shed roof; open front; concrete pier foundations; board and batten exterior.

566 SHEEP SHED 16 ft. by 24 ft. Bill of Materials.
25 sheep; gable roof; enclosed; concrete pier foundations; board and batten exterior.

HAY SHED

500 HAY SHED Bill of Materials.
To be built in 16 ft. sections or bays 28 ft. wide, capacity 20 tons loose hay per section. Trussed framing on concrete piers. Lower half open; upper half closed with boards and battens; gable roof.

Serial Numbers

FEED BARNS

546-7 FEED OR HAY BARN 36 by 60 ft. Bill of Materials
Two hay bays 24 by 36 ft. each; 12 ft. center drive. Post and plate framing; concrete piers; gable roof; board and batten exterior; capacity 50 tons.

656 FEED BARN
Two stories; to be build in 14 ft. sections or bays 32 ft. wide with hay capacity of 16 tons per section. Gambrel roof; 9 ft. center drive concrete foundations. Drawings show only framing for end and intermediate bay.

EXHIBITION STRUCTURES

1438-9-40 CATTLE SHOW BARN 60 by 112 ft. Bill of Materials
Frame construction, monitor roof; trusses; dirt floor; space for 80 tie stalls.

1441-2-3 -4-5 JUDGING AND SALES PAVILION 80 by 98 ft. Bill of Materials
Frame construction, flat roof, trussed, selling ring, grand stand seating capacity 800-1000, cleaning and toilet rooms.

MISCELLANEOUS

655 STANDARD HORSE STALL DETAILS Bill of Materials
Shows construction of, concrete, planks overlay and block floors, details of partitions and mangers and dimensions of single and double stalls.

1095 MANURE PIT 16 by 20 ft. Bill of Materials
Concrete with gable roof on posts; roof projects to make shelter for spreader; cistern for collecting liquid.

1173 FEED TROUGH 5 by 14 ft. Bill of Materials
Box trough on skids; for cattle or horses.

1232 SHEEP FEEDING RACK Bill of Materials
For use in barn, 2 ft. 6 in. wide may be built as long as desired. Tight troughs.

1416 STANDARD COW STALL DETAILS
Shows dimensions of stalls for various sized cows, details of four types of mangers and two types of gutters. Details for building concrete and cork brick floors.

1611 COW STANCHIONS
Homemade, of wood showing method of attaching to post and girder supports.

1613 HAY FEED RACK 4 by 12 ft. 4 in. Bill of Materials
Portable on skids, solid bottom and trough, 1 by 4 inch slats 2'-10" above trough.

Serial Numbers

1616 HAY FEED RACK 7 by 28 ft. 10 in. Bill of Materials
For cattle; shown built on concrete posts, solid board bottom and trough, 2 x 4 slats, height 7 ft. 10 in. above trough.

1627 DEHORNING CHUTE 3 1/2 by 8 ft. Bill of Materials
Stationary crate.

1855 DIPPING VAT FOR CATTLE & HORSES
Concrete pit showing arrangement of cutting gates and draining pens.

2192 SELF FEEDER FOR CATTLE 6 by 14 ft. Bill of Materials
On skids for pasture use; capacity 8 tons grain trough space for 12 head.

2197 DEHORNING CHUTE AND SQUEEZE GATE

2198 CATTLE SHED. 20 by 60 ft.
Closed on three sides with vertical boards and battens, concrete foundation; length can be increased by building 12 foot bays.

2199 HAY FEED RACK FOR CATTLE 5 by 16 ft.
On skids, tight box to catch loose hay that falls from slatted rack.

BILL OF MATERIALS FOR GENERAL BARN

Serial No. 612-13
" " 655

Concrete

Quantities are for foundation 3'6" below grade and must be changed if actual depths are different.

Foundations and base of floors to be concrete, mixed in the proportions of one (1) part Portland cement, three (3) parts sand and five (5) parts gravel or broken stone.

Top 1/2" of bin, alley and sheep pen floors and top 1" of horse and cow stable floors to be mortar, mixed in the proportions of one (1) part Portland cement and two and one half (2 1/2) parts sand.

	Cement	Sand	Gravel
Foundations:	155 sacks	17.25 cu.yd.	28.75 cu.yd.
Floors:			
4" base, bins & alley	58 sacks	6.5 cu.yd.	10.75 cu.yd.
1/2" top " " "	18 sacks	1.6 cu.yd.	
4" base, Cow stable	20 sacks	2.5 cu.yd.	4.00 cu.yd.
1" top " "	10 sacks	1.0 cu.yd.	
* 4" base behind horses	11 sacks	1.25 cu.yd	2.00 cu.yd
1" top " "	7 sacks	0.6 cu.yd.	
4" base sheep pens	50 sacks	5.5 cu.yd.	9.25 cu.yd.
1/2" top " "	15 sacks	1.5 cu.yd.	

* See sheet 655 for concrete materials in Horse Stalls

Lumber

13 - 2" x 6" x 16' sills
8 - 2" x 6" x 14' plates
32 - 2" x 6" x 16' "
8 - 6" x 6" x 14' posts
10 - 2" x 4" x 14' struts
15 - 2" x 4" x 16' "
8 - 2" x 8" x 20' end braces
66 - 2" x 6" x 10' upper rafters
66 - 2" x 6" x 12' lower rafters
66 - 2" x 4" x 10' upper braces
66 - 2" x 4" x 12' lower "
33 - 1" x 8" x 12' struts
16 - 2" x 6" x 10' collar beams
66 - 2" x 6" x 18' shed rafters
33 - 2" x 4" x 10' " " braces
16 - 1" x 6" x 16' " " hangers
35 - 2" x 4" x 20' joists & shed ties.
8 - 2" x 6" x 16' longitudinal ties.
2 - 2" x 8" x 12' ridge

Horse Stalls - Partitions:

14 - 2" x 6" x 10' uprights
13 - 2" x 8" x 10' partition boards
[illegible] - 2" x 8" x 16' " "
4 - 2" x 8" x 18' " "
2 - 2" x10" x 10' " "
1 - 2" x10" x 18' " "
4 - 1" x 6" x 12' hardwood
1 - 2" x 6" x 8' bead

Mangers:

2 - 2" x 10" x 18'
2 - 2" x 12" x 18'
6 - 1" x 8" x 18'
4 - 1" x 6" x 18'
4 - 1" x 4" x 18'
1 - 2" x 12" x 12'
1 - 2" x 10" x 16'
4 - 2" x 4" x 16'
100 ft. 2" band iron

LUMBER (Cont'd)

Gates to box stall:
8 - 1" x 6" x 12'
2 pr. extra heavy 8" strap hinges
Latch as preferred.

3650 ft. B.M. 1" x 4" shingle lath (includes 10% waste)
10 - 1" x 12" x 14'
45 M. shingles

	Sides	North End	South End
Studs	34 - 2" x 4" x 14' 4 - 2" x 6" x 16'	4 - 2" x 6" x 10' 7 - 2" x 6" x 12' 6 - 2" x 6" x 14' 8 - 2" x 6" x 16' 4 - 2" x 8" x 18'	3 - 2" x 6" x 10' 5 - 2" x 6" x 12' 6 - 2" x 6" x 14' 8 - 2" x 6" x 16' 2 - 2" x 6" x 18' 4 - 2" x 6" x 20'
Girts heaters etc	8 - 2" x 4" x 14' 7 - 2" x 4" x 16' 3 - 2" x 6" x 14' 2 - 2" x 8" x 14' 3 - 2" x10" x 10'	10 - 2" x 4" x 10' 2 - 2" x 4" x 14' 7 - 2" x 4" x 16' 1 - 2" x 6" x 10' 2 - 2" x 8" x 14' 1 - 2" x10" x 10'	8 - 2" x 4" x 10' 3 - 2" x 4" x 12' 4 - 2" x 4" x 14' 6 - 2" x 4" x 16' 1 - 2" x 6" x 10'
Barn boards	44 - 1" x 12" x 16'	18 - 1" x 12" x 10' 16 - 1" x 12" x 12' 27 - 1" x 12" x 14' 36 - 1" x 12" x 16' 12 - 1" x 12" x 18' 6 - 1" x 12" x 20'	
Battens	40 - 1/2" x 3" x 16'	14 - 1/2" x 3" x 10' 14 - 1/2" x 3" x 12' 25 - 1/2" x 3" x 14' 33 - 1/2" x 3" x 16' 12 - 1/2" x 3" x 18' 2 - 1/2" x 3" x 20'	

Ventilators
1350 ft. B.M. 1" x 4"
T & G flooring
5 squares paper
2 - 27" G. I. ventilators
2 - G.I. hoods
2 - G.I. slides with netting

Hay Chute Doors:
150 ft. B.M. 1" x 6"
T & G flooring
4 - 1" x 6" x 12'
2 - 1" x 8" x 16'
4 prs. light hangers
28 ft. track

Interior Alley Doors
60 ft. B.M. 1" x 6" flooring
2 - 1" x 6" x 14'
2 pr. 6" T hinges

Interior Sliding Doors of Cow Stable.
70 ft. B.M. 1" x 6" flooring
2 - 1" x 6" x 12'
2 pr. light hangers
16 ft. track.

Bin Doors
6 - 1" x 12" x 14'
10 - 1" x 2" x 10'

LUMBER (Cont'd.)

Doors to Sheep Pens and Horse and Cow Stables, (3 double, 2 single doors)

200 ft. BM 1"x 4" D&M flooring
12 - 1"x 8"x 16' battens
2 - 1"x10"x 16'
2 - 1"x 4"x 16' water table.
64 ft. birdproof track
8 pr. hangers for same
8 - 6 lt. sash 10"x 12" glass
8 pr. 2 1/2" G.I. butts with brass pins
Latches as preferred

Exterior Alley and Bin Doors
120 ft. BM 1"x 4" T&G flooring
8 - 1"x 6"x 12'
7 - 1"x 2"x 14' stops
6 pr. 6" hinges (Tee)
6 pr. 4" " "

Interior Walls.
Sills
11 - 2"x 6"x 10' bin partitions
4 - 2"x 4"x 10' mow "
4 - 2"x 4"x 20' " "
1 - 2"x 4"x 12' cow stable

Siding, etc.
1860 ft. BM 1"x 6" Shiplap, mow walls
1200 ft. BM 1"x 6" T&G flooring, bins
120 ft. BM 1"x 4" slats for corn crib
1000 ft. BM 1"x 6" T&G flooring, cow stable
1280 ft. BM 1"x 6" T&G flooring over alley etc.
(includes 20% waste)

Studs
24 - 2"x 4"x 16' bins
30 - 2"x 4"x 16' lower mow
31 - 2" x4"x 12' upper mow
2 - 2"x 4"x 8' cow stable
3 - 2"x 4"x 12' " "
2 - 2"x 4"x 14' " "

Plates (etc)
14 - 2"x 6"x 10' bins
4 - 2"x 6"x 20' bins
12 - 2"x 4"x 20' mow
16 - 2"x 6"x 16' "
12 - 2"x 4"x 10' joists
10 - 2"x 4"x 12' "
10 - 2"x 4"x 18' "
2 - 2"x 8"x 10' girder in corn crib
20 - 2"x 4"x 16' hay chute
63 - 1"x 6"x 16' " "

Hay door
135 ft. BM 1"x 4" D&M flooring
1 - 2"x 6"x 10'
1 - 2"x10"x 10'
3 - 1"x 6"x 10'
3 - 10" strap hinges, extra long

Trim
16 - pcs. 1"x 4 1/2"x 16' under eaves
22 - pcs. 1"x 4 1/2"x 14'
2 - " 1"x 4 1/2"x 12' hay door
16 - " 1"x 4 1/2"x 12' windows
1 - " 1"x 4 1/2"x 14' windows
1 - " 1"x 8"x 8' alley stable and grain doors
1 - " 1"x 8"x 10' hay door

Miscellaneous.
70 - 1/2" x 12" foundation bolts, nuts and washers
16 - 6 light sash 10" x 18" glass complete with stock frames & shields.
3 - 4 " transoms 8" x 12" glass
1 - 12 " double hung window 10" x 12" glass
132 ft. 6" Galv. iron gutter
36 ft. 4" " " downspouts with bends & turn outs.
66 ft. hay track, 33 brackets & hangers.

BILL OF MATERIALS FOR DAIRY BARN

Serial Nos. 839 - 840

40 cows facing in or out
Dimensions 84'-4" x 34'-0"

Concrete Work.

The quantities given are required for foundations and floors as shown on drawing and must be changed if actual depths are different. Foundations should be carried down below frost line.

Mixtures: Foundations and base of floors, 1 part cement, 3 parts sand 5 parts gravel or broken stone; or 1 part cement, 6 parts bank run gravel. Top coat 1 part cement, 2 1/2 parts sand.

	Wall	Floor Base 5" thick	Floor Finish 1" thick
Cement	88 sacks	240 sacks	99 sacks
Sand	9.7 cu. yds.	26.6 cu. yds.	9.2 cu. yds.
Gravel	16.2 cu. yds.	44.3 cu. yds.	
	OR	OR	
Cement	88 sacks	240 sacks	
Bank run gravel	21 cu. yds.	58 cu. yds.	

For each additional foot depth of foundation add 30 sacks cement, 3.3 cubic yards sand, and 5.5 cubic yards gravel.

LUMBER:

Sills.
35 - 2" x 6" x 10'
4 - 2" x 6" x 14'

Studs.
157 - 2" x 6" x 10'
7 - 2" x 6" x 12'
11 - 2" x 6" x 14'
10 - 2" x 6" x 13'

Plates
40 - 2" x 6" x 10'
8 - 2" x 6" x 12'

Horizontal Bridging.
26 - 2" x 6" x 12'
6 - 2" x 6" x 16'
2 - 2" x 6" x 18'

Braces.
2 - 2" x 6" x 10'
2 - 2" x 6" x 12'
4 - 2" x 6" x 14'
2 - 2" x 6" x 16'

Truss.
94 - 2" x 4" x 20'
47 - 2" x 4" x 12'
24 - 2" x 4" x 16'
*94 - 2" x 6" x 22' ends S.4 S.
** 94 - 2" x 8" x 22' " "
24 - 1" x 6" x 16' vertical ties
47 - 2" x 6" x 14' " "
48 - 2" x 4" x 12' knee braces

Drop Siding.
2832 feet B. M. plus 25%

* In North use 2" x 8"
** In South use 2" x 8"

Inside Sheathing.
5850 feet B.M.plus 25%

Roof Sheathing
8356 lin. ft. 1" x 4" plus 10%

Shingles
33 1/2 M. plus 10%

If barn is built in North, add:

Sheathing 0 - 2718 feet B.M.plus 20%

Paper - 24 squares

Ridge Boards
10 - 1" x 6" x 12' S. 4 S.
4 - 1" x 6" x 14' S. 4 S.

Facia.
43 - 7/8" x 8" x 10' S. 4 S.

Trim
8 - 1" x 4 1/2" x 10' S. 4 S.
3 - 2" x 4" x 12' S. 4 S. blocks
4 - 2" x 6" x 22' S. 4 S.

Doors
327 ft. B.M. 1" x 4" T&G Flooring
Includes 25% waste
10 - 1" x 8" x 16' S. 4 S.
10 - 1" x 6" x 16' "
4 - 1 1/2" x 2 1/2" x 14' S.4 S.
4 - 1 1/2" x 2 1/2" x 16' "
8 - 3/4" x 2 1/2" x 16' "
8 - 3/4" x 2 1/2" x 14' "

Door Frames
5 - 1 1/2" x 8" x 14' S. 4 S.
5 - 1 1/2" x 8" x 16' "

Trim
4 - 1 1/2" x 4" x 14' S. 4 S.
5 - 1 1/2" x 4" x 16' "

Windows
6 - 1 1/2" x 9" x 14' S. 4 S. sill
22 - 1 1/4" x 8" x 12' " sash
22 - 3/4" x 2" x 12' " stop
6 - 1 1/2" x 2" x 14' " stool
44 - 1" x 4" x 12' " trim

Louvre
1 - 1" x 8" x 18' S. 4 S. frame
1 - 1 1/2" x 10" x 10' S. 4 S.sill
2 - 1" x 4" x 10' S. 4 S. trim
4 - 7/8" x 10" x 12' S. 4 S.

ventilator Hoods
6 - 2" x 4" x 10'
1 - 2" x 8" x 18'

Miscellaneous.
22 cellar sash 3 lights 10"x16"glass
22 single sash 6 lights 10"x12" glass
3 - 22" G.I.ventilator hoods and dampers
77 sq.ft. # 26 gage G.I. flashing
22 pair # 18 gage G.I. sash receivers
22 - 1" x 3/16" x 3' wrought steel straps
16 - 6" x 14" # 26 gage G.I. intake hoods screened
16 - 6" x 14" # 26 gage G.I. inlet dampers
36 - 5/8" x 16" bolts, nuts,& washers
94 - 5/8" x 6" " " "
94 - 5/8" x 8" " " "
22 pair 2" butt hinges
44 incased spring window bolts
66 feet barn door track
8 pair barn door hangers
6 barn door fasteners
10 barn door guides
Stanchions and pipe supports for 40 stalls

Nails
13# - 40dd
205# - 20d
41# - 10d
193# - 8d
174# - 6d
114# - 3d shingle

Paint
9 1/2 gallons for outside

Drain Pipe
4 pieces 2" W.I. pipe 5'-6" long
4 ells 2" W.I. pipe
4 ells 4" T.C.pipe
4 - 4" running trap
4 - 4" Y branch and enough 4" T.C. pipe to carry drain from bldg.

August 1918.

BILL OF MATERIALS FOR DAIRY BARN

Serial Nos. 839-840

52 cows facing in or out
Dimensions 105'-4" x 34'-0"

Concrete Work

The quantities given are required for foundations and floors as shown on drawing and must be changed if actual depths are different. Foundations should be carried down below frost line.

Mixtures: Foundations and base of floors, 1 part cement, 3 parts sand, 5 parts gravel or broken stone; or, 1 part cement, 6 parts bank run gravel. Top coat 1 part cement 2 1/2 parts sand.

	Wall	Floor Base 5" thick	Floor Finish 1" thick
Cement	104 sacks	300 sacks	122 sacks
Sand	11.4 cu. yds.	33.2 cu. yds.	11.4 cu. yds.
Gravel	19.0 cu. yds.	55.3 cu. yds.	
	OR	OR	
Cement	104 sacks	300 sacks	
Bank run gravel	24.5 cu. yds.	72 cu. yds.	

For each additional foot depth of foundation add 35 sacks cement, 3.9 cubic yards of sand, and 6.6 cubic yards gravel.

LUMBER:

Sills
2 - 2" x 6" x 10'
4 - 2" x 6" x 14'
24 - 2" x 6" x 16'
2 - 2" x 6" x 18'

Studs
177 - 2" x 6" x 10'
7 - 2" x 6" x 12'
13 - 2" x 6" x 14'
10 - 2" x 6" x 18'

Plates
45 - 2" x 6" x 10'
9 - 2" x 6" x 12'

* In North use 2" x 8"
** In South use 2" x 6"

Horizontal Bridging
34 - 2" x 8" x 12'
4 - 2" x 6" x 16'
2 - 2" x 6" x 18'

Braces
2 - 2" x 6" x 10'
2 - 2" x 6" x 12'
4 - 2" x 6" x 14'
2 - 2" x 6" x 16'

Truss
110 - 2" x 4" x 20'
111 - 2" x 4" x 12'
44 - 2" x 4" x 10'
*110 - 2" x 6" x 22' S. 4 S. ends
**110 - 2" x 6" x 22' " " "
28 - 1" x 6" x 16' Vertical Ties
55 - 2" x 6" x 14' " "

-24 (839-40; 34' wide, 52 cows)

Drop Siding
3290 feet B.M. plus 25%

Inside Sheathing
7180 feet B. M. plus 25%

Roof Sheathing
10,890 lin. feet 1" x 4"
plus 10%

Shingles
41 1/2 M. plus 10%

If barn is built in North add:

Sheathing - 3158 feet B.M. plus 20%

Paper - 28 squares

Ridge Boards
22 - 1" x 6" x 10' S. 4 S.

Facia
32 - 7/8" x 8" x 16' S. 4 S.

Trim
8 - 1" x 4 1/2" x 10' S.4 S.
3 - 2" x 4" x 12' S.4 S. blocks
4 - 2" x 6" x 22' S.4 S.

Doors
327 feet B.M. 1"x4" T&G flooring
10 - 1" x 8" x 16' S.4 S. (+ 25%)
10 - 1" x 6" x 16' S.4 S.
4 - 1 1/2" x 2 1/2" x 14' S.4 S.
4 - 1 1/2" x 2 1/2" x 16' "
8 - 3/4" x 2 1/2" x 16' "
8 - 3/4" x 2 1/2" x 14' "

Door Frames
5 - 1 1/2" x 8" x 14' S. 4 S.
5 - 1 1/2" x 8" x 16' "

Trim
4 - 1 1/2" x 4" x 14' S. 4 S.
5 - 1 1/2" x 4" x 16' "

Windows.
7 - 1 1/2" x 9 1/2" x 14' S.4 S sills
26 - 1 1/4" x 8" x 12' S. 4 S. sash
26 - 3/4" x 2" x 14' S. 4 S. stop
7 - 1 1/2" x 2" x 14' S. 4 S. stool
52 0 1" x 4" x 12' S. 4 S. trim

Louvre
1 - 1" x 8" x 18' S. 4 S.
1 - 1 1/2" x 10" x 10' S. 4 S.
2 - 1" x 4" x 10' S. 4 S.
4 - 7/8" x 10" x 12' S. 4 S.

Ventilator Hoods
6 - 2" x 4" x 10'
1 - 2" x 8" x 18'

Miscellaneous
26 cellar sash 3 lights 10"x16" glass
26 single sash 6 lights 10"x12" glass
3 - 26" G.I. ventilator hood and dampers.
88 sq. ft. #26 gage G.I. flashing
26 pair #18 gage sash receivers
26 - 1" x 3/16" x 3' wrought steel straps
20 - 6" x 18" #26 gage G.I. intake hoods screened.
20 - 6" x 18" #26 gage G.I. inlet dampers
40 - 5/8" x 16" bolts, nuts & washers
110 - 5/8" x 6" " " "
110 - 5/8" x 8" " " "
26 pair 2" butt hinges
52 incased spring window bolts
66 feet barn door track
8 pair barn door hangers
6 barn door fasteners
10 barn door guides
Stanchions and pipe supports for 52 stalls

Nails
16# - 40d
240# - 20d
45# - 10d
232# - 8d
202# - 6d
141# - 3d shingles

Paint
13 gallons for outside

Drain Pipe
4 pieces 2" W.I. pipe 5'-6" long
4 ells 2" W.I. pipe
4 ells 4" T.C. "
4 - 4" running traps
4 - 4" Y branch and enough T.C. pipe to carry drain from bldg.

August 1918

BILL OF MATERIALS FOR A CORN CRIB

Serial No. 521

- - - - -

Quantities given are for dimensions on the drawings, if the dimensions are changed the quantities should be altered.

CONCRETE Mixture: One (1) part Portland cement, three (3) parts sand, five (5) parts screened gravel or broken stone.
Cement - 125 bags; sand 12½ cu.yd.; gravel 20 cu.yd.
120 ft. 4-inch drain tile, plus line to outlet.

LUMBER

4 - 2"x 4"x 16' studs
38 - 2"x 6"x 10' "
4 - 2"x 6"x 12' "
4 - 2"x 6"x 14' "
50 - 2"x 6"x 16' "
16 - 2"x 6"x 16' plates
34 - 2"x 4"x 12' rafters
17 - 2"x 4"x 16' "
4 - 2"x 4"x 20' "
11 - 2"x 8"x 14' lintels & crossties
4 - 2"x 4"x 12' corner braces
8 - 2"x 4"x 14' " "
4 - 2"x 6"x 12' cross braces
2 - 2"x 4"x 16' gable braces
7 - 1"x 8"x 16' ties
3 - 2"x 4"x 16' drag door battens

12 - 1"x 4"x 12' trim
1 - 1"x 3"x 16' "
1 - 1"x 8"x 16' louvre
1 - 1"x10"x 4' "
1 - 1"x 6"x 16' "
4 - 1"x 2"x 12' door strips
8 - 1"x 4"x 16' inside door
1 - 1"x19"x 16' " "
12 - 1"x 3"x 10' vents) for each shaft
2 - 1"x 2"x 10' ")
3 - 1"x 3"x 16' vents) for each trough
1 - 1"x 2"x 16' ")
6 - 1"x 8"x 12' outside door
11,000 - 10" shingles.

900 ft. BM 7/8" x 6" side sheathing (beveled 2 edges)
480 ft. BM 7/8"x 4" siding strips
300 ft. BM 7/8" drop siding
865 ft. BM 1"x 4" S.1 S. sheathing
350 ft BM.7/8" x 3 1/2" matched flooring 12 ft. lengths (door)

MISCELLANEOUS

24 - 1/4" x 1 1/2" wrought iron hinges as shown.
24 - 3/8" x 1 1/2" " " hasps and staples
48 - 1/4" x 3 1/2" bolts with washers (for drag doors)
100 lin.ft. 26 gauge G.I. metal strips 8" wide (outside)
90 " " 26 " " " " 10" wide (inside)
10 " " 26 " " " " 4" wide (inside doors)
100 " " 1/2" mesh wire netting 20 gage 20" wide
65 " " 1/2" " " " 20 " 24" wide
8 rods 52" fence wire (concrete reinforcement)
55 lb. 4d shingle nails
80 lb. 8d common nails
80 - 2"x 6" stud sockets
4 pair bird proof door hangers
40 lin.ft..track for hangers
4 - 2" stay rollers
4 - steel bumpers
20' track

10 lb. 20 d. common nails
3 lb. 3/4" G.I. staples
68' - 6" G.I. gutter
20' - 4" G.I. downspouts
4 - 45 deg. elbows
2 - 90 " turnouts
2 - 4 " outlets

8 gallons white lead and oil paint.

ITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
IVISION OF AGRICULTURAL ENGINEERING

Information Series No. 26 (Revised) September, 1926.

DAMPPROOFING METHODS

No waterproofing preparation can make amends for a concrete that is not dense and uniform throughout. Many existing structures permit water to penetrate the walls or have damp walls which must be remedied. In certain cases heavy water pressures must be resisted while in others all that is necessary is to prevent the penetration of moisture by capillary action.

A practically watertight concrete can be made, without the use of any extraneous material, which will resist hydrostatic heads up to 40 feet. In order to secure such an impermeable concrete strict attention must be paid to the details of proportioning, mixing, placing and curing. Directions for making good concrete are given in Farmers' Bulletin 1279, "Plain Concrete for Farm Use." A copy of this bulletin may be obtained from the Office of Publications, Department of Agriculture, Washington, D. C., as long as the supply lasts.

Although concrete can be made practically waterproof, no concrete as ordinarily made will be entirely so. On this account there are in use many materials and devices for making concrete impervious to moisture. These waterproofing schemes seldom if ever add strength to the concrete and many methods damage the cement, making the concrete less durable. However, waterproofing is required at times and may often be wisely done on the face of the concrete or incorporated in the whole body of the concrete. The various processes used to waterproof or dampproof concrete consist of: incorporating a substance or preparation designed to reduce its porosity either by filling the voids or repelling the moisture; or else applying coatings, plasters or washes to the surface. Existing structures are waterproofed by one of the latter methods. Frequently some integral material is incorporated with plaster or wash coats.

In addition to the substances sold under trade names the following materials are in common use. Except as indicated, the Bureau has not experimented with these substances but the subject matter is taken from sources believed to be reliable.

Hydrated Lime:

Hydrated lime is easily handled and is perhaps one of the best materials to use for filling voids. It is especially desirable in lean mixtures which it seems to strengthen and lubricate thus facilitating placing of mortar. The amount of lime used should not exceed 10% of the weight of the cement. Ordinarily it is much more desirable to purchase extra cement instead of hydrated lime and use a richer mixture.

The two following preparations form more or less insoluble compounds which practically fill all pores.

Alum and Soap Mixture.

Dissolve one pound of alum in 2 gallons of water and, separately, $2\frac{1}{4}$ pounds of soap in 8 gallons of water. Mix the two solutions, stirring frequently to prevent the compound from accumulating on the surface. The compound is used in place of the mixing water. This method of waterproofing increases the strength of the concrete about 20%.

Lime and Soap Mixture:

Dissolve $\frac{1}{4}$ pound of soap per gallon of water and add $\frac{1}{2}$ oz. of unslaked lime. Stir the mixture thoroughly to keep in suspension the calcium soap formed. The solution is used in place of the mixing water.

Lye and Alum Mixture:

A process said to be effective 12 years after application is as follows:

Dissolve one pound of concentrated lye and 5 pounds of alum in 2 gallons of water, care being taken that every particle is dissolved. Heating to near the boiling point will insure this without injury to the mixture. This constitutes the stock which may be made up in any quantity in the same proportions. To one pint of the stock add 10 pounds of cement thinning out with water until the mixture spreads well with a whitewash brush, lathering freely and filling all pores in the surface. Usually 1 pint of the stock and 10 pounds of cement thoroughly mixed in a 12 quart pail with enough water to well fill the pail makes the wash about right. If the surface to be treated is dry it should be sprayed with water just before the wash is applied. The wash is best applied to the concrete three or four days after it is cast and while it is being kept wet in curing; a few hours are sufficient for the wash to harden enough to stand a spray. The wash is not satisfactory for old work, but is especially adapted to waterproofing concrete block and stucco. Sometimes 1 part of this stock to 30 parts water is used in place of mixing water in making 1:2 mortar for facing; this waterproofs the surface and leaves the face free from brush marks.

Oil-Mixed Portland Cement Concrete:

Tests by the Bureau have shown that a heavy mineral residual oil, when incorporated with concrete mixtures is very effective in making the concrete non-absorbent, however, the addition of this oil does not increase the impermeability of concrete subjected to heavy water pressure and this method alone will probably not make the concrete proof against percolation of water through the mass.

The use of such oil is described in Department Bulletin 230, "Oil-mixed Portland Cement Concrete." As this bulletin is no longer available the following abstract has been made:

Oil-mixed concrete differs from ordinary concrete only in that oil is an additional ingredient in the mixture. All oils are not suitable but any oil that meets the following specifications should prove satisfactory.

(1) The oil shall be a fluid petroleum product and shall contain no admixture of fatty or vegetable oils.

(2) It shall have a specific gravity not greater than 0.945 at a temperature of 25° C.

(3) It shall show a flash point of not less than 150° C. by the closed-cup method.

(4) When 240 cc. of the oil is heated in an Engler viscosimeter to 50° C., and maintained at that temperature for at least three minutes the first 100 cc. which flows out shall show a specific viscosity of not less than 15 nor more than 30.

(5) When 1 part of the oil is shaken up with 2 parts of hundredth normal caustic soda, there shall be no emulsification, and upon allowing the mixture to remain quiet the two components shall rapidly separate in distinct layers.

The general purpose of the above clauses is as follows:

Claude 1 eliminates compounded products in which the presence of saponifiable oils would break down the strength of the cement. Clause 5 has a similar purpose in eliminating certain straight petroleum residuals which readily emulsify with alkali, and seriously impair the strength of the mortar to which they are added. Clauses 2, 3, and 4 combine to prevent the use of certain asphaltic oils which prove detrimental to the strength of the concrete, and clause 4, in particular, prescribes an oil of such viscosity as to be readily miscible with the mortar, while still possessing sufficient body to render the structure dampproof.

As the above tests cannot be made readily outside of a laboratory the following oils are mentioned as being generally satisfactory: - Gargoyle Mobile Oils "A" and "B", Gargoyle Crank Case Oil and V. C. Oil 704, which are manufactured by the Vacuum Oil Company, 61 Broadway, New York City. These oils are rather expensive but can be obtained in small quantities which may make their use desirable.

Method of Making:

For most purposes where dampproofing is required an amount of oil equal to 5% of the cement by weight is all that is necessary. A bag of cement weighs 94 pounds, and consequently, for each bag of cement used in the mixture, 4.7 pounds or about 2½ quarts of oil are required.

Let it be supposed that a batch of concrete requiring two bags of cement is to be mixed in the proportions of 1 part of cement to 2 parts of sand to 4 parts of broken stone or gravel, together with 5% of oil. Four cubic feet of sand are first measured out in a bottomless box, 12 inches deep and 2 feet on each side. On top of the sand is spread the cement and these materials are mixed together until they appear to be of uniform color. Water is then added to the mixture and the mass again mixed to a mortar of mushy consistency. Five quarts of oil are then measured out and added to the mortar and the mass again turned until there is no trace of oil visible on the surface of the mortar. Particular care should be taken to continue the mixing until the oil is thoroughly incorporated in the mixture. Experience has shown that to insure the very best results the length of time of mixing should be practically double that required when oil is not used. The oil-mixed mortar is then combined with the stone or gravel previously moistened and the mass is again turned until all of the stone is thoroughly coated with the mortar and the mass is uniformly mixed throughout. Should only oil-mixed mortar be desired, the process is similar to that above described except that no stone is added.

In a machine mixer the cement, sand, and water are first mixed to a mortar, then alternate batches of oil and stone are added until the required quantity of oil is mixed, and then the remainder of the stone is added and mixed. When a batch mixer is used, the exact method of procedure should be determined by experiment, owing to the fact that different makes of mixers require slightly different handling to insure best results. A continuous mixer should not be used in oil-cement-concrete work, as with this type the time of mixing can not readily be increased to the extent necessary to insure a uniform distribution of the oil.

Materials Required for 1 Cubic Yard:

The following table gives the proportions by parts and amounts required of cement, sand, stone, and oil to make a cubic yard of oil-mixed mortar and concrete:

Quantities of materials required for 1 cubic yard of oil-mixed mortar and concrete.

Proportions by Parts				Cement (bbls.[1])	Sand (Cubic Yards)	Stone or Gravel (Cubic Yards)	Oil (gallons[2])
Cement	Sand	Stone or Gravel	Oil (Per Cent)				
1	.....	.....	3	8.31	.....	.....	12.1
1	2	.....	5	3.32	0.93	.....	8.06
1	3	.....	5	2.48	1.05	.....	6.02
			10				12.04
1	4	.....	5	1.98	1.11	.....	4.8
			10				9.61
1	2	4	5	1.57	.44	0.88	3.81
1	$2\frac{1}{2}$	5	5	1.30	.46	.92	3.15
			10				6.3
1	3	6	5	1.11	.47	.94	2.69
			10				5.38

[1] One barrel of cement equals 4 bags.

[2] Oil weighs about $7\frac{3}{4}$ pounds per gallon.

A mortar made of 1 part Portland cement, 2 parts sand and 5% ($2\frac{1}{2}$ quarts per bag) of oil may be used for the wearing coat of a basement floor; plastering the surfaces of stone, brick or concrete walls; the scratch or first coat in stucco work; and exposed surfaces of water containers.

A basement wall if made of 1:$2\frac{1}{2}$:5 concrete to which is added 10% of oil based on the weight of the cement should not leak; while 5% of oil added to a 1:2:4 mixture is said to produce non-absorbent concrete blocks. The mixture recommended for cisterns is 1:2:4 with 10% oil.

The general principles of building floors are given in Information Series 43, "Concrete Sidewalks, Feeding Floors, Curbs and Steps;" applying stucco is outlined in Information Series 51, "Stucco;" while Information Series 56, describes how to make concrete block. These papers can be had from the Division of Agricultural Engineering, Bureau of Public Roads, Washington, D. C.

The admixture of oil is not detrimental to the tensile strength of mortar composed of 1 part cement and 3 parts sand when the oil added does not exceed 10% of the weight of the cement used. The compression strength however suffers slightly (having 75% of plain concrete at 28 days) although when not over 10% of the oil is used the decrease in strength is not serious. Concrete mixed with oil requires a period of time from 50 to 100% longer to set hard than does plain concrete, but the increase in strength is nearly as rapid in the oil mixed material as in the plain concrete.

The bond between concrete and plain-bar reinforcement is decreased by the use of oil in the concrete, but when deformed bars, wire mesh, or expanded metal is used there is no apparent decrease in bond.

———————"———————

Membraneous Coating:

Various methods are used for coating or washing the surfaces of existing concrete structures to lessen or prevent dampness or the penetration of water.

Farmers' Bulletin 1572, "Making Cellars Dry," describes the method of applying a membraneous coating to walls and floors which is probably the most reliable but also the most expensive of methods ordinarily used. The use of tile drains is discussed and the effectiveness of interior ventilation emphasized. A copy of this bulletin may be purchased from the Superintendent of Documents, Washington, D.C. for 5¢ in coin, as long as the supply lasts.

———————"———————

Other methods commonly used in addition to plaster coats, containing the so-called integral preparations are:

Cement Wash:

Several brush coats of cement and water of a creamy consistency are beneficial. Surface imperfections should be removed and the walls wet before applying the wash. Before the first coat is dry, a second coat should be applied, and this should be kept moist for several days. The wash is liable to craze or crack if exposed to the action of sun and rain, especially during the first few weeks after is is applied. The wash should be applied to the inside surfaces of the containers.

Sylvester's Wash:

Sylvester's wash has long been used for waterproofing brick work and concrete which has hardened and dried out. It consists in the alternate applications of alum and of soap solutions to the face of the wall. The alum solution is made by dissolving eight ounces of alum per gallon of water, and the soap solution by dissolving one and one-half pounds of hard soap per gallon of water. The surface should be clean and dry so that the solutions will be readily absorbed. The air temperature should not be less than 50°F. The soap solution should be applied boiling hot, while the alum solution should be about 70°F. A coat of the soap solution is first applied, using a whitewash or other convenient brush and rubbing it well into the surface but taking care not to produce a froth. This is left for 24 hours or until the surface is entirely dry. A coat of the alum is then applied and allowed to dry for another 24 hours. This is followed with another coat of soap and another of alum at similar intervals. Two pairs of

coats should be sufficient for any ordinary case, though additional ones may be applied if required. The effect of this treatment is to form a more or less insoluble compound of calcium soap in the outer pores of the concrete, this soap filling the pores and acting as a water repellent. It is one of the most effective treatments which can be given a concrete surface, however, it becomes less effective with age.

Paraffin Coating:

A paraffin coating may be applied either cold or hot. In either case the surface should be clean and dry. If the coating is applied hot the walls to be treated must be heated. The melted paraffin is then thoroughly rubbed in. Six and one-half pounds of paraffin makes one gallon of the melted paraffin and will cover about 250 square feet. A blow torch is convenient for heating the walls and as an aid in spreading thin layers of paraffin. In the cold process, the paraffin is dissolved in a volatile liquid such as naptha and applied with a brush. The volatile liquid evaporates and leaves the surface appearance the same as before but with the outer pores filled with paraffin. Four pounds of paraffin dissolved in $\frac{1}{2}$ gallon of gasoline or naptha will make one gallon of the solution. One gallon has a covering capacity of 200 square feet. At least two coats should be given. Sometimes asphalt is used in the same manner as paraffin.

Water Glass:

Sodium silicate or water glass, may be applied to a surface to waterproof it. Two coats are usually sufficient. This treatment is more expensive than the soap and alum treatment and is probably no more effective.

Coal Tar:

The following directions for using coal tar are copied from the "Iowa Homestead," of April 20, 1916. The use of this material is recommended in accordance with results secured in tests conducted by the Iowa Agricultural College.

"Heat thin coal tar to the boiling point, at which time kerosene is added in the proportion of 1 part of the latter to 8 of coal tar. Care must be taken in pouring in the kerosene, and those who use this mixture are advised not to stand close in the pouring process. Afterwards, 1 part neat cement is added to 8 parts of the mixture. Then apply with a brush to the surface that is to be waterproofed. It is said that this mixture will penetrate to a depth of 1 to 3 inches. It is entirely practical to apply this material to the interior of walls, in which case the use of rather a large proportion of cement is recommended. This mixture should not be used to waterproof the interior of cisterns as it will impart a disagreeable taste to the water."

BILL OF MATERIALS FOR GENERAL BARN

Serial No. 612-13
" " 655

Concrete

Quantities are for foundation 3'6" below grade and must be changed if actual depths are different.

Foundations and base of floors to be concrete, mixed in the proportions of one (1) part Portland cement, three (3) parts sand and five (5) parts gravel or broken stone.

Top 1/2" of bin, alley and sheep pen floors and top 1" of horse and cow stable floors to be mortar, mixed in the proportions of one (1) part Portland cement and two and one half (2 1/2) parts sand.

	Cement	Sand	Gravel
Foundations:	155 sacks	17.25 cu.yd.	28.75 cu.yd.
Floors:			
4" base, bins & alley	58 sacks	6.5 cu.yd.	10.75 cu.yd.
1/2" top " " "	18 sacks	1.6 cu.yd.	
4" base, Cow stable	20 sacks	2.5 cu.yd.	4.00 cu.yd.
1" top " "	10 sacks	1.0 cu.yd.	
* 4" base behind horses	11 sacks	1.25 cu.yd.	2.00 cu.yd
1" top " "	7 sacks	0.6 cu.yd.	
4" base sheep pens	50 sacks	5.5 cu.yd.	9.25 cu.yd.
1/2" top " "	15 sacks	1.5 cu.yd.	

* See sheet 655 for concrete materials in Horse Stalls

Lumber

13 - 2" x 6" x 16' sills
8 - 2" x 6" x 14' plates
32 - 2" x 6" x 16' "
8 - 6" x 6" x 14' posts
10 - 2" x 4" x 14' struts
15 - 2" x 4" x 16' "
8 - 2" x 8" x 20' end braces
66 - 2" x 6" x 10' upper rafters
66 - 2" x 6" x 12' lower rafters
66 - 2" x 4" x 10' upper braces
66 - 2" x 4" x 12' lower "
33 - 1" x 8" x 12' struts
16 - 2" x 6" x 10' collar beams
66 - 2" x 6" x 18' shed rafters
33 - 2" x 4" x 10' " " braces
16 - 1" x 6" x 16' " " hangers
35 - 2" x 4" x 20' joists & shed ties.
8 - 2" x 6" x 16' longitudinal ties.
2 - 2" x 8" x 12' ridge

Horse Stalls - Partitions:

14 - 2" x 6" x 10' uprights
12 - 2" x 8" x 10' partition boards
[illegible] - 2" x 8" x 16' " "
4 - 2" x 8" x 18' " "
2 - 2" x10" x 10' " "
1 - 2" x10" x 18' " "
4 - 1" x 6" x 12' hardwood
1 - 2" x 6" x 8' bead

Mangers:

2 - 2" x 10" x 18'
2 - 2" x 12" x 18'
6 - 1" x 8" x 18'
4 - 1" x 6" x 18'
4 - 1" x 4" x 18'
1 - 2" x 12" x 12'
1 - 2" x 10" x 16'
4 - 2" x 4" x 16'
100 ft. 2" band iron

LUMBER (Cont'd)

Gates to box stall:
8 - 1" x 6" x 12'
2 pr. extra heavy 8" strap hinges
Latch as preferred.

3650 ft. B.M. 1"x 4' shingle lath (includes 10% waste)
10 - 1' x 12" x 14'
45 M. shingles

	Sides	North End	South End
Studs	34 - 2" x 4" x 14' 4 - 2" x 6" x 16'	4 - 2" x 6" x 10' 7 - 2" x 6" x 12' 6 - 2" x 6" x 14' 8 - 2" x 6" x 16' 4 - 2" x 8" x 18'	3 - 2" x 6" x 10' 5 - 2" x 6" x 12' 6 - 2" x 6" x 14' 8 - 2" x 6" x 16' 2 - 2" x 6" x 18' 4 - 2" x 6" x 20'
Girts heaters etc	8 - 2" x 4" x 14' 7 - 2" x 4" x 16' 3 - 2" x 6" x 14' 2 - 2" x 8" x 14' 3 - 2" x10" x 10'	10 - 2" x 4" x 10' 2 - 2" x 4" x 14' 7 - 2" x 4" x 16' 1 - 2" x 6" x 10' 2 - 2" x 8" x 14' 1 - 2" x10" x 10'	8 - 2" x 4" x 10' 3 - 2" x 4" x 12' 4 - 2" x 4" x 14' 6 - 2" x 4" x 16' 1 - 2" x 6" x 10'
Barn boards	44 - 1" x 12" x 16'	18 - 1" x 12" x 10' 16 - 1" x 12" x 12' 27 - 1" x 12" x 14' 36 - 1" x 12" x 16' 12 - 1" x 12" x 18' 6 - 1" x 12" x 20'	
Battens	40 - 1/2" x 3" x 16'	14 - 1/2" x 3" x 10' 14 - 1/2" x 3" x 12' 25 - 1/2" x 3" x 14' 33 - 1/2" x 3" x 16' 12 - 1/2" x 3" x 18' 2 - 1/2" x 3" x 20'	

Ventilators
1350 ft. B.M. 1" x 4" T & G flooring
5 squares paper
2 - 27" G. I. ventilators
2 - G.I. hoods
2 - G.I. slides with netting

Hay Chute Doors:
150 ft. B.M. 1" x 6" T & G flooring
4 - 1" x 6" x 12'
2 - 1" x 8" x 16'
4 prs. light hangers
28 ft. track

Interior Alley Doors
60 ft. B.M. 1" x 6" flooring
2 - 1" x 6" x 14'
2 pr. 6" T hinges

Interior Sliding Doors of Cow Stable.
70 ft. B.M. 1" x 6" flooring
2 - 1" x 6" x 12'
2 pr. light hangers
16 ft. track.

Bin Doors
6 - 1" x 12" x 14'
10 - 1" x 2" x 10'

LUMBER (Cont'd.)

Doors to Sheep Pens and Horse and Cow Stables, (3 double, 2 single doors)

200 ft. BM 1"x 4" D&M flooring
12 - 1"x 8"x 16' battens
2 - 1"x10"x 16'
2 - 1"x 4"x 16' water table.
64 ft. birdproof track
8 pr. hangers for same
8 - 6 lt. sash 10"x 12" glass
8 pr. 2 1/2" G.I. butts with brass pins
Latches as preferred

Exterior Alley and Bin Doors
120 ft. BM 1"x 4" T&G flooring
8 - 1"x 6"x 12'
7 - 1"x 2"x 14' stops
6 pr. 6" hinges (Tee)
6 pr. 4" " "

Interior Walls.
Sills
11 - 2"x 6"x 10' bin partitions
4 - 2"x 4"x 10' mow "
4 - 2"x 4"x 20' " "
1 - 2"x 4"x 12' cow stable

Siding, etc.
1860 ft. BM 1"x 6" Shiplap, mow walls
1200 ft. BM 1"x 6" T&G flooring, bins
120 ft. BM 1"x 4" slats for corn crib
1000 ft. BM 1"x 6" T&G flooring, cow stable
1280 ft. BM 1"x 6" T&G flooring over alley etc.
(includes 20% waste)

Studs
24 - 2"x 4"x 16' bins
30 - 2"x 4"x 16' lower mow
31 - 2" x4"x 12' upper mow
2 - 2"x 4"x 8' cow stable
3 - 2"x 4"x 12' " "
2 - 2"x 4"x 14' " "

Plates (etc)
14 - 2"x 6"x 10' bins
4 - 2"x 6"x 20' bins
12 - 2"x 4"x 20' mow
16 - 2"x 6"x 16' "
12 - 2"x 4"x 10' joists
10 - 2"x 4"x 12' "
10 - 2"x 4"x 18' "
2 - 2"x 8"x 10' girder in corn crib
20 - 2"x 4"x 16' hay chute
63 - 1"x 6"x 16' " "

Hay door
135 ft. BM 1"x 4" D&M flooring
1 - 2"x 6"x 10'
1 - 2"x10"x 10'
3 - 1"x 6"x 10'
3 - 10" strap hinges, extra long

Trim
16 - pcs. 1"x 4 1/2"x 16' under eaves
22 - pcs. 1"x 4 1/2"x 14'
2 - " 1"x 4 1/2"x 12' hay door
16 - " 1"x 4 1/2"x 12' windows
1 - " 1"x 4 1/2"x 14' windows
1 - " 1"x 8"x 8' alley stable and grain doors
1 - " 1"x 8"x 10' hay door

Miscellaneous.
70 - 1/2" x 12" foundation bolts, nuts and washers
16 - 6 light sash 10" x 18" glass complete with stock frames & shields.
3 - 4 " transoms 8" x 12" glass
1 - 12 " double hung window 10" x 12" glass
132 ft. 6" Galv. iron gutter
66 ft. 4" " " downspouts with bends & turn outs.
66 ft. hay track, 33 brackets & hangers.

En3 B

BILL OF MATERIALS FOR A FARM HOUSE.

Serial No. 522-3-4

BRICKWORK

Mixture for 1000 brick: If lime mortar is used: 2-1/2 bu. lime, 5/8 cu.yds.sand
Quantity: If lime mortar is used; 50 bu. lime, 12 cu. yds. sand.
or
Mixture for 1000 brick: If cement mortar is used: 6 sacks cement, 12 cu.yds.sand
Quantity: If cement mortar is used 114 sacks cement, 12 cu. yds. sand.

20,000 common brick.
20 lin. ft. 8" x 8" T. C. flue lining: 1 - 6" T. C. thimble
26 lin. ft. 8" x 12" " " " : 1 - 8" " "

CONCRETE

Mixture for base of floor & steps: 1 part cement; 3 parts sand; 5 parts screened gravel or broken stone.
Quantities for Base of Floors & Steps: 34 sacks cement, 4 cu. yds. sand, 6 cu. yds. gravel.
Mixture for top 1/2" of floors: 1 part cement, 2-1/2 parts sand.
Quantity for top 1/2" of floors: 9 sacks cement, 1 cu. yd. sand.

LUMBER

Girders

3 - 2" x 8" x 16'
3 - 2" x 8" x 12'
4 - 2" x 10" x 10'
4 - 2" x 8" x 10'

Framing

	NORTH	EAST	SOUTH	WEST
Sills	1 - 2"x6"x18' 1 - 2"x6"x14' 1 - 2"x4"x16' 1 - 2"x4"x14'	2 - 2"x6"x16' 1 - 2"x6"x12' 2 - 2"x4"x16' 1 - 2"x4"x12'	2 - 2"x6"x10' 2 - 2"x4"x10'	1 - 2"x6"x10' 1 - 2"x4"x10'
Studs	2 - 2"x4"x16' 7 - 2"x4"x14' 30 - 2"x4"x12'	10 - 2"x4"x10' 35 - 2"x4"x12' 3 - 2"x4"x14'	30 - 2"x4"x12' 2 - 2"x4"x10'	5 - 2"x4"x10' 30 - 2"x4"x12' 2 - 2"x4"x14'
Plates	2 - 2"x4"x16' 2 - 2"x4"x12' 2 - 2"x4"x10'	4 - 2"x4"x16' 2 - 2"x4"x12'	6 - 2"x4"x12'	4 - 2"x4"x14'
Horizontal:	8 - 2"x4"x10'	20 - 2"x4"x10'	9 - 2"x4"x10'	8 - 2"x4"x10'

4 - 2" x 6" x 12' Ribbon Board
1 - 2" x 6" x 10' " "
3 - 2" x 4" x 10' Basement Partitions
3 - 2" x 4" x 12' " "
6 - 2" x 4" x 14' " "
14 - 1" x 6" x 12' " "
7 - 1" x 6" x 16' " "
34 - 2" x10" x 18' Floor Joists
6 - 2" x10" x 14' " "
6 - 2" x10" x 12' " "
8 - 2" x 8" x 16' " "
8 - 2" x 8" x 10' " "
2 - 2" x 8" x 14' " "
300 - Lin. feet 1" x 3" Bridging

200 - 2" x 4" x 10' Inside Partitions
51 - 2" x 4" x 12' " "
5 - 2" x 4" x 14' " "
8 - 2" x 4" x 16' " "
13 - 2" x 4" x 10' Ceiling Rafters
27 - 2" x 4" x 12' " "
27 - 2" x 4" x 16' " "
25 - 2" x 4" x 10' Roof Rafters
23 - 2" x 4" x 12' " "
3 - 2" x 4" x 14' " "
23 - 2" x 4" x 16' " "
1 - 2" x 4" x 18' " "
6 - 2" x 4" x 10' Truss
6 - 2" x 8" x 12' "
4 - 2" x 4" x 16'

1 - 2" x 6" x 10'	Valley Rafters	
2 - 2" x 6" x 12'	"	"
3 - 2" x 6" x 14'	"	"
1 - 2" x 6" x 16'	"	"
3 - 2" x 4" x 10'	"	"
3 - 2" x 4" x 12'	"	"

Sleeping Porch Framing

4 - 2" x 6" x 10'	Sills
4 - 2" x 4" x 10'	"
32 - 2" x 4" x 10'	Studs
2 - 2" x 4" x 12'	
5 - 2" x 4" x 14'	Horizontal
5 - 2" x 4" x 10'	"
8 - 2" x 6" x 10'	Plate
2 - 2" x 6" x 10'	Ribbon
13 - 2" x 6" x 10'	Floor Joists
11 - 2" x 4" x 14'	Rafters
10 - 2" x 4" x 10'	Ceiling Rafters

Front Porch

2 - 2" x 6" x 12'	Sills
12 - 2" x 6" x 10'	Joists
2 - 2" x 10" x 18'	Plates
4 - 2" x 10" x 10'	"
3 - 2" x 4" x 12'	Studs
2 - 2" x 4" x 14'	"
4 - 2" x 6" x 12'	Look Outs
15 - 2" x 4" x 14'	Rafters
1 - 2" x 4" x 16'	Ridge
10 - 2" x 4" x 10'	Ceiling Rafters
2 - 4" x 8" x 10'	S 4 S Posts
6 - 8" x 8" x 10'	" "

Kitchen Porch

1 - 2" x 6" x 18'	Sill
1 - 2" x 4" x 18'	"
3 - 6" x 6" x 10'	S 4 S Posts
3 - 2" x 6" x 12'	Post Caps
1 - 2" x 6" x 16'	" "
5 - 2" x 4" x 12'	Studs
3 - 2" x 4" x 10'	"
2 - 2" x 4" x 18'	Plates
13 - 2" x 4" x 12'	Ceiling Joists
1 - 2" x 6" x 18'	Ledger

Louvres (all S 4 S)

9 - 1" x 6" x 12'	Slats
1 - 1" x 4 1/2" x 14'	Trim
1 - 1" x 4 1/2" x 16'	"
2 - 1" x 4" x 14'	Frame
2 - 1" x 4" x 10'	Frame
1 - 1 1/2" x 6" x 5'	Sill

Siding (Includes 20% waste)

1250 feet B.M. 1" x 12"
1605 feet B.M. 1" x 6" clapboards

Shingles

126000

Outside Trim.

150 lin. ft.	2 1/2" x 2 1/2 drip mould.
150 "	" 1" x 6" S 4S Facia
4 - 1" x 6" x 18'	S 4 S
4 - 2" x 4" x 18'	"
5 - 1" x 6" x 14'	"
2 - 2" x 4" x 14'	
4 - 1/2" x 1/2" x 10'	Beading
6 - 1" x 6" x 10'	Inside Trim
5 - 1" x 6" x 10'	Apron
4 - 1" x 4" x 10'	Stool
2 - 1" x 4" x 10'	Gutter
2 - 1" x 1 1/2" x 10'	gutter
1 - 1" x 10" x 6'	
1 - 1" x 4" x 6'	
4 - 1-1/8" x 2" x 16'	Screens
8 - 1-1/8" x 2" x 10'	"
2 - 1-1/8" x 3" x 16'	"
230 - lin. ft.	screen mould

Belt Cornice

19 - 2" x 4" x 12'
8 - 2" x 4" x 10'

Flooring (includes 25% waste)

2040 ft. B.M. 1" x 4"

Lookouts

7 - 2" x 6" x 16' Ends dressed

Roofing Lath (includes 20% waste)

2624 ft. B. M. 1" x 6"

Steps
5 - 2" x 12" x 12' Carriages
11 - 1" x 12" x 12' Treads
11 - 1" x 6" x 12' Risers

Trim Front Porch (all S 4 S)
4 - 1" x 10" x 14' Lintel
2 - 1" x 2" x 14' "
2 - 2" x 3" x 14' Barge
2 - 1" x 8" x 14' Box Cornice
18 lin. ft. 2 1/2" x 2 1/2" Drip Mould
40 lin. ft. 3/4" x 6" Trim
20 " " 1 1/8" Nosing
50 " " 2" Crown Mould
6 corner blocks per design

Ceiling (includes 20% waste)
6220 ft. B.M. 1 x 4 D&M

Inside Trim
250 lin. ft. 1" x 8" base
390 " " crown mould
610 " " 3/4" quarter round
140 " " 1" x 4" S 4 S Trim

Closet Shelves
10 - 1" x 12" x 12' S 4 S
100 lin. ft. 1" x 1" Cleats

Nails
96# 20d
130# 16d
260# 10d
390# 8d
65# 6d
96# 3d Fine
130# 4d Shingle
100# 8d Finish

Paint
13 gallons for 3 coats outside
10 gallons varnish inside

Dresser per detail

Trim Sleeping Porch (all S 4 S)
2 - 2" x 4" x 14' Barge
7 - 1" x 10" x 10' Panels
10 - 1/2" x 2 1/2" x 10' "
1 - 1" x 4" x 12' "
4 - 1" x 8" x 10' Trim
1 - 1" x 8" x 16' "
4 - 1" x 12" x 10' "
2 - 2" x 8" x 16' Sill
12 - 1" x 4" x 10'
2 - 1" x 4" x 16'
4 - 1/2" x 3" x 10'
2 - 1/2" x 1/2" x 16' Beading

Trim Kitchen Porch (all S 4 S)
1 - 1" x 6" x 16' Box over posts
3 - 1" x 6" x 10' " " "
2 - 1" x 6" x 12' " " "
35 lin. ft. 1" x 12"
2 - 1" x 10" x 12'
2 - 1 1/8" x 2" x 10' Screens
2 - 1 1/8" x 3" x 10' "
2 - 1 1/8" x 4" x 10' "
13 - 1 1/8" x 2" x 8' "
180 lin. ft. screen mould.

Miscellaneous
18 - 3/8" x 5'-0" round rods, kitchen floor
28 - 3/8" x 7'-9" " " over furnace room
50 - 3/4" x 18" bolts, nuts, & washers, sills
300 sq. feet, Galv. wire cloth, screens
2 - Galv. iron drip sleeves, sleeping porch
20 feet Galv. sheet metal 12" wide, gutter
1 - Cast Iron cleanout door.
200 lin. ft. Galv. iron 5" gutter
50 lin. ft. 3" Galv. iron down spout
10 - 3" sleeves
5 lengths 3" cast iron pipe
20 lin ft. flashing 24" wide
150 " " " 14" "
2 pair 6" Tee hinges.
1 pair 4" strap hinges

Windows (Frames listed separately)

8 - Double hung 2'-10 1/2" x 5'-7" x 1 3/8" upper sash 9 lights, lower sash 1 light. (See "I" on schedule sheet #1.)
2 - Double hung 2'-0 1/4" x 5'-7" x 1 3/8" upper sash 9 lights, lower sash 1 light. (See "II" on schedule sheet #1.)
2 - Pair casement 3'-0 1/2" x 4'-5 3/4" x 1 3/8" (See "III" on schedule sheet #1.)
2 - Pair casement 3'-4 1/2" x 4'-5 3/4" x 1 3/8" (See "IV" on schedule sheet #1.)
1 - Pair casement 2'-6" x 3'-5 1/2" x 1 3/8" (See "V" on schedule sheet #1.)
3 - Cellar sash, 3 lights, 7" x 9" glass.

Window frames and trim

5 - Single frames for "I", inside and outside trim and hardware.
1 - Double frame for two "I", inside and outside trim and hardware - living room
1 - Triple frame for two "II", and one "I", inside and outside trim and hardware Dining Room.
2 - Casement frames for "III", inside and outside trim and hardware.
2 - Casement frames for "IV", inside and outside trim and hardware.
1 - Casement frame for "V", inside and outside trim and hardware - Bath Room.
3 - Cellar frames, outside trim and hardware.

Doors

1 - #1 Front door 3' x 7' x 1 3/4", 6 lt. sash
Frame inside and outside trim.
1 pr. 4 x 4 butts
3 tumbler front door lock set.

1 - #2 - 4' x 7' x 1 3/8" door, 18 lt. sash.
Frame, 2 inside trims.
1 pr. 3 1/2" x 3 1/2" butts, lock.

1 - #3 - 2'-10" x 7', 12 light sash
Frame, 2 inside trim.
3 1/2" x 3 1/2" butts, lock.

1 - #4 - 3' x 7' screen door
Hinges & (lock) latch.

2 - #7 - 2' x 7' x 1 3/8"
Frame, inside trim.
Hinges, locks

5 - #8 - 2'-6" x 7' x 1 3/8"
Frame, inside trim
Hinges & locks.

1 - #9 - 2'-10" x 7' x 1 3/8"
Outside & inside trim,
Lock, hinges,

Door #6

12-sq.ft. T&G Ceiling,
18 lin. ft. 1" x 6" casing
hinges and lock.

2 - #12 - 2'-4" x 7' x 1 3/8"
2 frames, 3 inside trim.
2 hinges, 2 locks.

1 - #13 - 2'-10" x 7'
2 inside trim and frames
Hinges & locks.

1 - #14, Two 2'-6" x 7' x 1 3/8"
Frame for double door
2 inside trim.
1 Chain bolt, 1 foot bolt
2 pr. hinges - 1 lock.

1 - #10, 2'-10" x 7' x 1 3/8" double acting.
1 pr. double-acting door hinges
2 inside trim, frame.

1 - #11, 2'-10" x 7', 9 lt.sash & 6 lt. transom,
Inside and outside trim, frame.
Locks & hinges.

BILL OF MATERIALS FOR SWEET POTATO STORAGE HOUSE

Serial No. 881

. . . . . .

Concrete:

Quantities are for dimensions shown on the drawing and must be altered if dimensions are changed. Footings should be carried below frost line or to solid ground.

Mixture: One part Portland cement, three parts sand, and five parts gravel or broken stone; or, one part Portland cement and six parts bank-run gravel. Quantities: Cement, 6 sacks; sand, 20 cubic feet; gravel, 31 cubic feet. Or cement, 6 sacks; bank-run gravel, 1.5 cubic yards.

Chimney: 190 bricks.

Mixture for Mortar: One part Portland cement, three parts sand. Cement, 1 sack; sand, 4 cubic feet. 1 - 6" terra-cotta thimble.
6 linear feet of 8" x 8" terra cotta flue lining.

Lumber:

Girders:
2 - 6" x 10" x 12'
3 - 6" x 10" x 16'

Plates:
6 - 2" x 4" x 16'
6 - 2" x 4" x 12'

Rafters:
11 - 2" x 4" x 16'
1 - 1" x 6" x 18' (ridge)

Flooring: (includes 25% waste)
1,000 feet B. M. 1" x 4"
tongue and groove

Trim: (surfaced 4 sides)
5 - 1 1/8" x 4 1/2" x 18'
1 - 1 1/8" x 4 1/2" x 14'
2 - 1" x 6" x 16'
2 - 1" x 8" x 16'
2 - 1" x 8" x 12'
2 - 1" x 6" x 18'
70 linear feet 1 1/8" x 2 1/2" drip molding.

Joists:
17 - 2" x 8" x 12'

Studs:
19 - 2" x 4" x 16'

Ties:
4 - 2" x 4" x 12'

Sheathing: (includes 20% waste)
2,084 feet B. M. 1" x 6"

Drop Siding: (includes 20% waste)
6.5 feet B. M. 1" x 6"

Platform:
3 - 2" x 4" x 12'
1 - 2" x 8" x 14'
3 - 2" x 8" x 12'
1 - 4" x 4" x 6'
1 - 2" x 12"x 12'
2 - 1" x 10" x 14'

Ventilators in Roof: (Surfaced 4 sides)
3 - 1" x 12" x 14'

Lumber: (continued)

Bins:
6 - 2" x 4" x 16'
3 - 2" x 4" x 12'
2 - 2" x 2" x 16'
6 - 1" x 2" x 16'
34 - 1" x 4" x 12'
65 - 1" x 4" x 14'

Chimney:
1 - 2" x 6" x 12' (platform)

Roof covering:
As desired, for 290 square feet.

Building Paper: 20 squares

Miscellaneous:
2 single sash and frames, for 6 lights 9" x 12" glass
1 #2 glazed door, 3' x 7', 6 lights 8" x 10" glass.
1 frame for glazed door 3' x 7'
1 pair 6" galvanized T hinges
2 pairs 2 1/2" x 2 1/2" galvanized hinges
4 pairs 4" galvanized T hinges
2 pairs 2" x 2" galvanized hinges
2 chains 8" long with screw eyes and hooks
4 window spring bolts
3 pairs 2 1/4" x 7/8" sash centers
1 pair 3 1/2" x 3 1/2" loose pin butts
1 - 2" cleat
1 - 2" window pulley
36 feet of 1/4" rope
9 - 5/8" x 18" bolts, nuts & washers
2 - 1/4" x 2 1/2" wrought steel straps
12 feet galvanized iron flashing, 6" wide
4 " " " " 12" "
4 bolts 3/8" x 3", with 4" rings
14 square feet 1/4" mesh wire cloth
Fasteners for windows, doors, and shutters as desired.
4 - 1/4" x 3" lag screws
2 chain bolts, chains & keepers

Nails:
4 pounds 20-penny
17 " 10- "
85 " 8- "
10 " 6- "
3 " 8- " finishing.

Paint:
For three outside coats, 4 gallons

SUPPLEMENTAL BILL OF MATERIALS
FOR
SWEET POTATO HOUSE

Serial No. 881.

If potatoes are to be stored in crates the stud walls should be 11'-6" high instead of 7'-8" as shown on the drawings and the following changes should be made in the quantities of materials listed in the bill of materials, attached, for a house with 7'-8" studs above the floor which provides for bulk storage.

Add	Omit
38 - 2" x 4" x 12' studs	19 - 2" x 4" x 16' studs
530 ft. B.M. 1" x 6" sheathing	5 - 1-1/8" x 4-1/2" x 18' Trim
265 ft. B.M. 1" x 6" drop siding	All items under Bins
280 ft. B.M. 1" x 4" T&G flooring	1 - 2" x 6" x 12' chimney platform.
10 - 1-1/8" x 4-1/2" x 12' S4S Trim	
4 - 2" x 4" x 16' slat floor	
35 - 1" x 4" x 14' " "	
2 - 2" x 6" x 10' chimney platform	
2 - squares building paper	

This building was designed for the storage of potatoes in crates or in one tier of bins in which the potatoes may be loaded six feet high.

SUPPLEMENTAL BILL OF MATERIALS
FOR
SWEET POTATO HOUSE

Serial No. 894-5

If potatoes are to be stored in crates the stud walls should be 12'-4" high instead of 9'-4" as shown on the drawings, and the following changes should be made in the quantities of materials listed in the bill of materials attached for a house with 9'-4" studs and providing for bulk storage.

Add

54 - 2" x 4" x 12' side studs
4 - 2" x 4" x 10' window studs
24 - 2" x 4" x 12' end studs
16 - 2" x 4" x 10' side plates
8 - 2" x 4" x 10' end plates
8 - 1-1/8" x 4-1/2" x 10' S4S Trim
8 - 2" x 4" x 10' stops
8 - 2" x 4" x 10' bridging
12 - 2" x 6" x 12' ties and braces
8 - 2" x 4" x 10' on top of ties
830 ft. B.M. 1" x 6" sheathing
420 ft. B.M. 1" x 6" drop siding
440 ft. B.M. 1" x 4" T & G Ceiling
4 squares of building paper

Omit

26 - 2" x 4" x 18' side studs
4 - 2" x 4" x 12' over windows
12 - 2" x 4" x 18' end studs
24 - 2" x 4" x 10' side plates
12 - 2" x 4" x 10' end plates
4 - 1-1/8" x 4-1/2" x 18' S4S Trim

All bin lumber except:

18 - 2" x 4" x 12' removable floor
72 - 1" x 4" x 16' slats for floor
8 - 1" x 6" x 10' battens for shutters and doors.

This building was designed for the storage of potatoes in crates or in one tier of bins in which the potatoes may be loaded six feet high.

BILL OF MATERIALS FOR A SWEET POTATO HOUSE
Serial No. 1637

DDmensions 16 by 29 1/2 ft. Capacity about 1000 bu. in crates.

Quantities are for dimensions shown on drawings. Footings should bear on solid ground. If piers are built to a greater height they should be increased in cross-sectional area.

Concrete Foundations: Mixture: 1 part Portland cement, 3 parts sand, and 5 parts gravel or broken stone. Quantities: 12 bags cement, 1 1/4 cu.yds. sand, 1 1/2 cu.yds. gravel.

Chimney:
730 brick; 12 lin. ft. 8" x 8" T.C.Flue lining; 1 - 5" T.C. Thimble.
3 sacks cement, 1/2 cu.yd. sand; 4 lin. ft. galv. flashing 18" wide.

Lumber.
6 - 8" x 10" x 16' girders
2 - 4" x 10" x 16' "
26 - 2" x 8" x 16' joists.
64 - 2" x 4" x 12' studs
11 - 2" x 4" x 10' horizontals.
8 - 2" x 4" x 12' braces.
12 - 2" x 4" x 16' plates
32 - 2" x 6" x 10' rafters
2 - 2" x 6" x 16' ties
9 - 2" x 6" x 8' collar beams.
100 lin. ft. 1" x 2"
2 - 1" x 8" x 16' ridge board
150 lin. ft. 1" x 3" bridging.
4600 sq. ft. Building paper.
682 sq. ft. area roof to be covered.
If slats over whole floor are desired use these items:
(17 - 2" x 4" x 12' slat floor
(60 - 1" x 4" x 12' " "
If slats under edges of boxes are desired use these items:
(120 lin. ft. 2" x 4"
(18 pieces 1" x 4" x 12'-0"

Platform.
1 - 2" x 4" x 10' posts
12 - 2" x 4" x 10'
1 - 2" x 8" x 14'
5 - 2" x 8" x 10'
1 - 2" x 10" x 10' steps
1 - 2" x 10" x 16' steps

Trim (all S4S)
4 - 2" x 6" x 10' rafters
6 - 1" x 8" x 16' base
111 lin. ft. 1 1/8" x 2 1/2" drip mould
8 - 1" x 4 1/2" x 12' corner boards
4 - 1" x 6" x 16' saddle boards
8 - 1" x 4 1/2" x 8' windows & doors

Ventilators.
4 - 1" x 10" x 12'
2 - 1" x 6" x 10 roofing boards
4 - 1" x 3" x 16'
4 pieces wire cloth 1/4"mesh,20"x15"
12 lin. ft. galv. flashing 18" wide
2 pairs 2 1/4" x 7/8" sash centers
2 screw eyes.

5500 ft. BM 1" x 6" sheathing (includes 20% waste
1500 ft. BM 1" x 6" drop siding (includes 20% waste
2500 ft. BM 1" x 4" T&G flooring (includes 25% waste)

Miscellaneous
16 pairs 2" galv. butts.
1 pair butts for door.
1 pair 6" galv. tee hinges.
1 lock and latch for door
Fasteners for shutters & windows.
Galv. iron for floor under stove
15 - 5/8" x 18" anchor bolts.
3 - 3/4" x 1/4" x 12" straps
6 lag screws.
6 gals. paint
4 - six light sash 9" x 12" glass with frames and sills
1 - 3 by 7 ft. glazed door 6 lights 8" x 12" glass with frame and sills
12 lin. ft. galv. wire cloth 1/2" mesh 18" wide

Nails: 35 lbs - 6d; - 6 lbs.-6d finish; 200 lbs.- 8d; 40 lbs.10d; 5 lbs.-20d

BILL OF MATERIALS FOR A MILK HOUSE

Serial No 1336

Concrete.

Quantities are for dimensions shown on drawing.

Mixture.

For foundations and 5 inch base of floor; one (1) part Portland cement, three (3) parts sand and five (5) parts gravel or broken stone. Top one inch of floor to be one (1) part Portland and two and one half (2 1/2) parts sand.

Material.

For foundations and 5 inch base of floors.
31 sacks cement; 3 cu. yds. sand; 5 cu. yds. gravel. For top 1 inch of floors, 6 sacks cement 1/2 cu. yd. sand. For plaster, 1 sack cement, 50 lbs. lime 1/3 cu. yd. sand.

Lumber

13 - 2" x 4" x 10' sills
25 - 2" x 4" x 14' studs
8 - 2" x 4" x 16' "
12 - 2" x 4" x 10' plates
2 - 2" x 4" x 12' braces
10 - 2" x 4" x 10' girths
5 - 2" x 4" x 10' horizontals
18 - 2" x 6" x 12' rafters

Trim (all S 4S)

10 - 1" x 6" x 10' eaves & corners
4 - 1" x 6" x 16' corners & jambs
1 - 2" x 6" x 12' window sills
4 - 1" x 4 1/2" x 10' windows
4 - 1" x 4 1/2" x 14' doors
430 ft. B.M. 1" x 3" T & G flooring
530 ft. B.M. 1" x 6" siding
400 ft. B.M. 1" x 10" roofing boards

Miscellaneous

22 - 1/2" bolts 16" long, nuts and washers.
4 - single sash, 4 light 10" x 16" glass
4 - pairs hinges and fasteners for windows
3 - glazed doors 2' 8" by 6' 8" with frames and hardware.
2 - " " 2' 6" by 6' 6" " " " "
Prepared roofing for 300 square feet.
2 - 8" galvanized vent hoods with dampers and flashing.
1 - 6" galvanized smoke flue " " " "
12 lin. ft. 6" drain pipe, 2 ells and 1 branch
3 " " 2" galv. iron pipe with 1 ell.
2 " " 1 1/2" galv. iron pipe
250 sq. ft. metal lath.
Cabinets, racks, etc., as per details.
2 - 6" bell traps.

Nails

5 lbs. 20d
15 lbs. 10d
50 lbs. 8d
8 lbs. finish.

1 1/2 gallons paint.

BILL OF MATERIAL
FOR A
SHOP, IMPLEMENT AND WAGON SHED.

- - -

Serial No. 570

Quantities are figured for dimensions on drawings and if dimensions are altered the quantities should be correspondingly changed.

CONCRETE

All concrete except floor of shop to be mixed in the proportions of one (1) part Portland cement, three (3) parts sand and five (5) parts gravel or broken stone. Concrete for floor to be one (1) part Portland cement; two (2) parts sand and four (4) parts gravel or stone.

	Cement	Sand	Gravel
Shop foundations	28 bags	3 cu. yd.	5 1/3 cu. yd.
Shop floor	19 bags	1 1/3 cu. yd.	2 2/3 cu. yd.
Wagon shed piers	4 bags	1/2 cu. yd.	2/3 cu. yd.
Implement shed piers	4 bags	1/2 cu. yd.	2/3 cu. yd.

CHIMNEY - 300 bricks; 24 lin.ft. 8"x 12" flue lining; 2 - 6" T.C.thimbles
Mortar to be 1 part cement; three parts sand
Materials for mortar 2 bags cement, 8 cu.ft. sand

LUMBER FOR SHOP

	North	East	South	West
Sills	1-2"x4"x18'	1-2"x4"x14'	1-2"x4"x18'	1-2"x4"x 8'
Studs	6-2"x4"x12' 1-2"x4"x16'	4-2"x4"x12' 4-2"x4"x14' 5-2"x4"x16'	6-2"x4"x12'	4-2"x4"x12' 2-2"x4"x14' 6-2"x4"x16'
Horiz. Girts and Plates	4-2"x4"x14' 1-2"x4"x16'	1-2"x4"x 8' 3-2"x4"x14'	2-2"x4"x18' 3-2"x4"x16'	2-2"x10"x9' 1-2"x6"x12' 1-2"x4"x10'
Ribbon	1-2"x4"x18'		1-2"x4"x18'	

FRAMING

20 - 2" x 6" x 14' rafters
7 - 2" x 6" x 10' "
1 - 2" x 8" x 18' ridge
3 - 2" x 6" x 10' ties
26 - 2" x 4" x 10' dormers
14 - 2" x10" x 16' joists
40 lin.ft. 1"x 3" bridging
2 - 2" x 12" x10' carriages
1 - 2" x 12" x 8' "
4 - 1" x 10" x12' treads S4S
1 - 1" x 6" x12' risers S4S
1 - 2" x 4" x12' rail S4S
1 - 4" x 4" x10' post S4S

TRIM - ALL S4S

68 lin.ft. 1" x 5"
68 " " 1 1/8" x 5"
68 " " 1"x4" ends of rafters
20 " " 1"x7" dormer
4 - 1" x 6" x 10' saddle boards
1 - 2" x 6" x 10' hoisting beam
640 ft.BM roof sheath. (includes 10%waste)
380 ft.BM side " (" 10% ")
8600 shingles
460 ft.BM 1"x 4" T&G flooring (includes 10% waste)
65 - 1"x12"x10' barn boards
69 - 1 1/2"x7/8" x 10' battens

WINDOWS & DOORS (For 4" studs)

5 window fromes, sash, inside & outside trim, as per drawing.
Sash to be 12 light 8" x 10" glass, check rail.
5 window frames, sash, inside & outside trim, as per drawing.
Sash to be 6 light, 8"x 10" glass, fixed single sash
1 pair double doors & frame, inside & outside trim.
Doors to be glazed and built up for 8'x 8' opening.
1 pair double doors & frame, inside & outside trim.
Doors to be glazed and built up for 5'x 6' opening.
1 single door frame, inside & outside trim.

MISCELLANEOUS

Hardware complete for 5 double hung windows.
4 pairs heavy barn door hinges & fasteners for 2 pairs built-up doors.
1 pair 6" T hinges, lock for single door
1 pair 6" T hinges & thumb latch for closet door
15 - 3/4" x 12" bolts, nuts and washers
65 lin.ft. G.I. flashings 6" wide.
1000 sq.ft. building paper
28 lin.ft. 4" downspout, 2 turnouts
40 lin.ft. 5" G.I. gutter & hangers
Nails 40 lb. 5d shingle; 45 lb. 8d; 10lb. 6d; 10lb. 10d common.

LUMBER FOR IMPLEMENT SHED

3 - 4" x 6" x 16' posts
1 - 4" x 6" x 8' "
21 - 2" x 6" x 12' girts & plates
4 - 2" x 6" x 16' " " "
4 - 2" x 8" x 14' rafters
1 - 4" x 4" x 10' roof braces
2 - 1" x 6" x 10' ties
4 - 1" x 8" x 14' ties
16 - 2" x 6" x 14' rafters & ties
18 - 2" x 4" x 10' rafters
4 - 2" x 6" x 18' ridge
3 - 2" x 6" x 12' knee braces
3 - 2" x 6" x 12' water tables
1 - 2" x 6" x 16' water tables

900 ft. BM roof sheathing
(includes 10% waste)
8100 shingles
33 - 1" x 12" x 12' siding
66 - 1 1/2" x 7/8" x 12' battens
50 lin.ft. 2" x 4" rail
6 - 1 1/4" x 5/16" x 2'6" iron straps
12 - 1/2" lag screws
23 lin.ft. galv. flashing 8" wide

NAILS

40 lb. 5d shingle; 22 lb. 8d common
15 " 10d common ; 10 lb. 6d "
20 " 16d "

LUMBER FOR WAGON SHED

3 - 4" x 6" x 16' posts
1 - 4" x 6" x 10' "
4 - 2" x 6" x 16' plates
4 - 2" x 6" x 10' "
3 - 2" x 8" x 18' ties
9 - 1" x 6" x 12' hangers & braces
34 - 2" x 4" x 12' rafters
1 - 1" x 6" x 14' ridge
1 - 1" x 6" x 12' ridge
6 - 2" x 4" x 12' knee braces
9 - 1" x12" x 12' siding boards
9 - 1 1/2" x 7/8" x 12' battens

700 ft.BM roof sheathing (includes 10% waste)
6300 shingles
6 - 1 1/4" x 5/16" x 2'6" iron strap
12 - 1/2" lag screws
24 lin.ft. galv. flashing 8" wide

NAILS

30 lb. 5d shingle
15 " 8d common
5 " 6d "
10 " 10d "
10 " 16d "

BILL OF MATERIALS FOR A FARM SHOP.

Serial Nos. 938-939

CONCRETE

Mixture: 1 part Portland cement, 3 parts sand, 5 parts screened gravel or broken stone.

Quantities:

	CEMENT	SAND	GRAVEL
Foundations	57 bags	6.9 cu. yds.	11.5 cu. yds.
Floor	47 "	5.3 "	8.7 "
Inclines	5 "	0.6 "	0.9 "
Total	109 "	12.8 "	21.1 "

Chimney

800 brick, 5 bags cement, 1/2 cu. yds. sand.
20 lin. feet 8" x 8" T. C. Flue Lining.
1 - 6" T. C. Thimble, 1 - 7" T. C. Thimble.

LUMBER

Framing

	NORTH	EAST	SOUTH	WEST
Sills	2 - 2"x6"x12' 2 - 2"x6"x14'	2 - 2"x6"x12'	2 - 2"x6"x18' 1 - 2"x6"x10'	2 - 2"x6"x16'
Studs	21 - 2"x6"x10'	10 - 2"x6"x10' 2 - 2"x6"x14'	17 - 2"x6"x10' 1 - 2"x6"x16'	12 - 2"x6"x10' 1 - 2"x6"x12'
Plates	2 - 2"x6"x14' 2 - 2"x6"x12'	4 - 2"x6"x12'	2 - 2"x6"x14' 2 - 2"x6"x12'	4 - 2"x6"x12'
Studs above plates		2 - 2"x6"x10' 2 - 2"x6"x12' 1 - 2"x6"x14' 1 - 2"x6"x16'		2 - 2"x6"x10' 2 - 2"x6"x12' 1 - 2"x6"x14' 1 - 2"x6"x16'
Horizontal	4 - 2"x6"x12' 1 - 2"x6"x10'	3 - 2"x6"x10' 1 - 2"x6"x14' 3 - 2"x6"x16'	2 - 2"x6"x16' 1 - 2"x6"x10'	1 - 2"x6"x12' 1 - 2"x6"x14'

Post

1 - 6" x 6" x 10'

Girders

6 - 2" x 8" x 14'

Rafters

32 - 2" x 6" x 18'
6 - 2" x 6" x 10' Collar Beam.
14 - 2" x 6" x 12' Joists.
14 - 2" x 6" x 14' "
12 - 1" x 6" x 14' Hangers.

1000 ft. B.M. 1"x6" Shingle Lath(Plus 10%)
300 " " 1"x6" T&G Flooring(" 20%)
10,000 Shingles
29 lin. feet Ridge Roll
11080 ft. B.M. Siding(Included 20% waste)

Trim

75 lin. feet 1 1/2" x 9 1/2" Base Board
75 " " 1" x 2 1/2" Water Table
8 - 1 1/8" x 4 1/2" x 10' Corner Trim.
4 - 1" x 2" x 18' Eaves Trim
4 - 1 1/8" x 7 1/2" x 16' Freize

Windows

5 - 9 Light, 9" x 12" Glass, Fixed Sash, Frame, and Outside Trim.
6 - Double-hung, 12 Light, 9" x 12" Glass, Frame, and Outside Trim.

Large Doors

2 - 1 5/8" x 9 1/2" x 10'	Bottom Rail
4 - 1 5/8" x 7 1/2" x 10'	Middle & Top Rail
3 - 1" x 4" x 10'	Batten
2 - 1" x 7" x 10'	Batten
1 - 1" x 2 1/2" x 16'	Sill for Sash
4 - 1 5/8" x 7" x 10'	Side Rail
2 - 1 5/8" x 5" x 14'	Side Rail
6 - 1 5/8" x 5" x 10'	Diagonals
2 - 7/8" x 5" x 16'	
4 - 1 1/2" x 10" x 12'	Track Board
2 - 1 1/2" x 5" x 16'	Casing
130 feet B. M. 1" x 6"	T&G Flooring
6 - 6 Light, 9" x 12"	Glass Single-sash 1 1/8"

Small Doors

1 - 1 5/8" x 9 1/2" x 8'	Bottom Rail
1 - 1 5/8" x 7 1/2" x 16'	Middle & Top Rail
2 - 1 5/8" x 5" x 16'	Side Rails
2 - 1 5/8" x 5" x 10'	Diagonals
1 - 1" x 4" x 8'	Batten
1 - 1" x 2 1/2" x 8'	Sill for Sash
50 feet B.M. 1" x 6"	T&G Flooring
2 - 6 Light, 9" x 12"	Glass Single-sash 1 1/8"

Casing listed under trim.
2 Frames & Sills for 3'-4" x 8' Door

Hardware

1 - Cast Iron Cleanout Door
8 lin. feet Flashing 12" Wide
18 - 5/8" x 16" Anchor Bolts, Nuts, and Washers.
40 lin. feet Covered Bird-proof Door Track
2 pairs Door Hangers
2 pairs Roller Guides
2 pairs 8" Tee Hinges
4 Fasteners or Locks
18 Sash Bolts
2 Drawer Pulls
8 - 1/4" x 5" Machine Bolts and Nuts, Machine Bench.
16 - 1/4" Washers, Machine Bench
12 - U Stirrup Bolts, Nuts, and Washers.

Metal Work Bench

1 - 2" x 6" x 14' Brackets
2 - 2" x 4" x 12'
1 - 3" x 12" x 8'
1 - 1" x 12" x 8'
15 feet B.M. 1" x 6" T&G Flooring
1 - 1" x 6" x 16' Drawers
1 - 1/2" x 6" x 16' "

Wood Work Bench

1 - 2" x 6" x 12'
1 - 1" x 6" x 10'
1 - 2" x 4" x 10'
1 - 1" x 12" x 10'
3 - 2" x 10" x 10' Ash or Maple
50 feet B.M. 1" x 6" Sheathing.

Battery Shelf

2 - 2" x 4" x 12'
1 - 1" x 12" x 6'

2 - 4" x 6" x 12' Shaft Support

Nails

10 lbs.	20d
18 lbs.	16d
10 lbs.	10d
40 lbs.	8d
2 lbs.	8d Casing
40 lbs.	4d Shingles

Paint

8 gallons Paint for Two Coats Outside.

August 1918.

BILL OF MATERIALS FOR BULL BARN.

Serial Nos. 936- 937
(For Southern Conditions)

CONCRETE MATERIALS

Foundation (figured for concrete extending 2'-0" below grade.)

Mixture: 1 part cement, 3 parts sand, 5 parts gravel or broken stone.
Cement 20 sacks, sand 2.25 cu. yds. gravel 3.75 cu. yds.
For each additional 12" of height add 7 sacks of cement; 0.74 cu.yds. sand; 1.22 cu. yds. gravel.

Floor.

5" Base, mixture, same as above.
14 sacks cement; 1.56 cu. yds. sand; 2.58 cu. yds. gravel.
1" Top, mixture, 1 part cement, 2 1/2 parts sand.
7 sacks cement, 0.53 cu. yds. sand.

LUMBER, ETC.

	North	South	East	West
Sills	1 - 2"x4"x16' 1 - 2"x4"x14'	1 - 2"x4"x16' 1 - 2"x4"x12'	2 - 2"x4"x12'	2 - 2"x4"x12'
Studs Headers, etc.	9 - 2"x4"x14' 2 - 2"x4"x8'	6 - 2"x4"x14' 4 - 2"x4"x12' 1 - 2"x4"x8'	4 - 2"x4"x14' 3 - 2"x4"x12'	3 - 2"x4"x14' 2 - 2"x4"x12' 1 - 2"x4"x8'
Plate	3 - 2"x4"x12'	3 - 2"x4"x12'	2 - 2"x4"x12'	2 - 2"x4"x12'

Joists
10 - 2" x 4" x 12'

Rafters
10 - 2" x 4" x 16'
2 - 2" x 6" x 16' S 4 S.

Verge Boards
4 - 7/8" x 4" x 12'

Frieze & Trim Under Eaves.
2 - 1 1/8" x 7 1/2" x 16'
3 - 1 1/8" x 4" x 12'

Ceiling
275 feet B.M. 1" x 6" D&M flooring

Windows
2 - 6 lights 9" x 12" glass with stock frames & outside trim as per detail

Ridge
2 - 1" x 6" x 10'

Braces
2 - 1" x 6" x 16'

Corner Boards
2 - 1 1/8" x 4 1/2" x 16'
2 - 1 1/8" x 3 3/8" x 16'

Sheathing
380 feet B.M. 1" x 8" for roof

Siding
550 feet B.M. 6" drop siding

Prepared Roofing
320 sq.ft. roof surface to be covered with prepared roofing as selected.

Single Door

1 stock door, 3'-0" x 7'-0" x 1 3/8"

Frame for Single Door

1 - 7/8" x 5 1/2" x 12' jamb
1 - 7/8" x 5 1/2" x 8' "
2 - 1 1/8" x 4" x 12' outside casing
1 - 1 1/8" x 4" x 8' "
1 - 1 1/2" x 2" x 12' stop
1 - 1 1/2" x 2" x 8' "

Drains

1 - manger drain with plug
1 - 8" bell trap
4" C.I. soil pipe from bell trap to 3'-0" outside of wall
2" galv. iron pipe from manger drain to 4" drain.
1" galv. iron pipe with fittings as required.
1"- 1" stop and waste.

Sliding Gate

1 - 2" x 8" x 14'
2 - 2" x 8" x 12'
1 - 2" x 6" x 8'
1 - 2" x 10" x 5'

Frames & Trim for Openings on South Side.

1 - 1 1/8" x 7 1/2" x 10' track plank
1 - 1 1/8" x 4" x 12' outside casing
1 - 1 1/8" x 4" x 14' " "
1 - 1 1/8" x 4" x 6' " "
1 - 7/8" x 5 3/4" x 8' jamb for gate opening
2 - 7/8" x 5 3/4" x 12' jamb for gate opening
1 - 7/8" x 4 5/8" x 10' jamb
1 - 7/8" x 4 5/8" x 8' "
1 - 1 1/2" x 6" x 7' sill

Nails

25# 8d
15# 20d
12# 10d

Hardware

1 swinging door lock set.
1 pair 3 1/2" x 3 1/2" loose pin butt hinges for door.
2 pair 3" x 3" loose pin butt hinges for windows
1 - 8 ft. sliding gate track with bolts, brackets, and hangers.
2 guide rollers.
2 awning pulleys for 5/16" diameter rope.
14 screw eyes.
2 screw pulleys for 5/16" diameter rope.
36 ft. 5/16" diameter rope.
2 sash catches or hooks.
14 - 5/8" x 16" anchor bolts.
1 - bull pen panel)
1 - bull pen gate.) Selected.
1 - bull pen manger with stanchion.)

August 1910.